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RESEARCH SUMMARY

A classification system is presented for aspen *(Populus tremuloides* Michx.) dominated forests on the Bridger-Teton National Forest in western Wyoming. Twenty-six aspen community types are defined and described. A diagnostic key that utilizes indicator plant species is provided for field identification of the community types. Vegetation composition, environment, productivity, relationship to surrounding vegetation, and successional status are discussed. Tables are provided for detailed comparisons.

ACKNOWLEDGMENTS

The authors gratefully acknowledge the contributions of the following individuals: Kirby DeMott, who assisted in data collection; Leila Shultz of the Intermountain Herbarium, who assisted in taxonomic verification; and Richard Shaw, Ronald Lanner, and especially Jan Henderson for valuable suggestions throughout the study.

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United States
Department of
Agriculture

Forest Service

**Intermountain
Forest and Range
Experiment Station**

Research Paper
INT-272

April 1981

Aspen Community Types on the Bridger-Teton National Forest in Western Wyoming

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INTRODUCTION

Intensive multiple use management for the resources produced by wildlands requires that we be able to categorize land units according to their potential productivity and likely response to management. This is especially true in the mountainous West where abrupt changes in environment create both striking and subtile differences in the land's capability to produce vegetation. Classifying lands for management purposes is not new. Resource management, however, has entered a new era. Classification systems used in the past, such as cover type classification, are often no longer adequate for the intensive management needed to satisfy current and future demands for the multiple resources wildlands are capable of producing. As a consequence, a substantial effort has been under way in recent years, especially in the Forest Services Region 1 (the Northern Region) and Region 4 (the Intermountain Region) to develop the types of classifications now essential for management.

The Bridger-Teton National Forest, the largest National Forest within the contiguous United States, lies just south of Yellowstone National Park and immediately west of the Continental Divide in western Wyoming (fig. 1). It is highly mountainous terrain with part of five mountain ranges and eight rivers falling within its borders. The north-south oriented Wyoming and Salt River Ranges, which make up the southern portion of the Forest, are composed of faulted and thrusted beds of sediment. The Teton Range, directly to the north, consists of highly glaciated Precambrian granites. Both the Gros Ventre and Wind River Ranges are angled in a southeasterly direction and are glaciated. The Gros Ventre mountains are uplifted sediments, while the Wind River Range has an exposed granite core. The southern portion of the volcanic Yellowstone Plateau occupies the northern end of the Forest. The rivers form part of four major drainage systems. The Snake, Buffalo, Gros Ventre, Hoback, Salt, and Greys Rivers are part of the Columbia system, and the Green and New Fork Rivers flow into the Colorado system. The Missouri and Bear River watersheds also drain a small portion of the Forest. Elevations within the Forest range from 5,663 ft (1 726 m) on the Snake River at Alpine to peaks well over 13,800 ft (4 200 m) in the Wind River Range.

The great diversity in topography, soils, elevation, and microclimate on this Forest create a broad range of major vegetation formations: grasslands, shrublands, forb meadows, aspen groves, coniferous forests, and alpine tundra. A detailed habitat type classification partitioning the natural variability within the coniferous forest formation on the area has been developed by Steele and others.[1] A habitat type classification has also been developed recently which is appropriate to much of the nonforest shrublands (Bramble-Brodahl 1978; Hironaka and Fosberg 1979). A detailed natural classification for the aspenlands on the Forest has been lacking, however. Reed (1971) placed the aspenlands in the Wind River Mountains, only a portion of the Forest, into a single *Populus tremuloides/Symphoricarpos oreophilus* habitat type, but substantial variability in species composition and successional status is encompassed by this type.

Scattered aspen groves form a very important element in the vegetation complex on the Bridger-Teton Forest. These groves are esthetically pleasing, highly valued multiple use areas, providing good watershed protection, abundant livestock forage, and habitat for many forms of wildlife. Habitat and esthetics are two values that are particularly significant here because of the heavy recreational use on the Forest. The lack of a suitable natural classification for these aspenlands prompted the cooperative effort between the Bridger-Teton National Forest and the Intermountain Forest and Range Experiment Station that culminated in this publication.

[1]Steele, R., D. Ondov, S.V. Cooper, and R.D. Pfister. Forest Habitat types of eastern Idaho-western Wyoming. USDA For. Serv., Intermt. For. and Range Exp. Stn., Ogden, Utah. (In preparation).

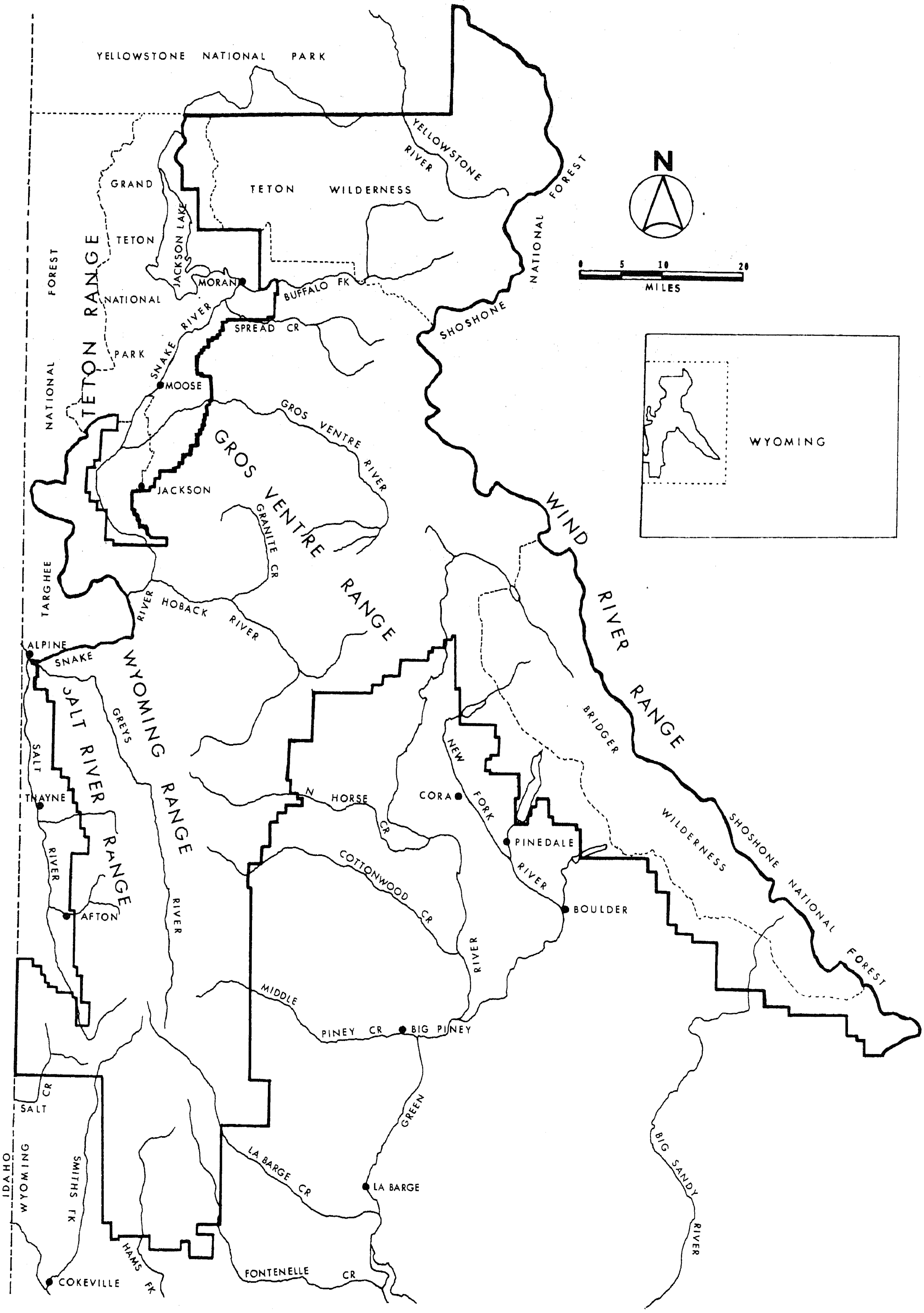

Figure 1.--The Bridger-Teton National Forest in relation to the major physiographic features of western Wyoming.

METHODS

A community type rather than habitat type approach was selected for defining the aspen communities on the Bridger-Teton Forest. Habitat types (Daubenmire 1952) are aggregations of land units capable of supporting similar climax plant communities, regardless of current successional status. This approach to classification is based upon the composition of climax plant communities. Community types are aggregations of similar plant communities based upon existing floristic composition, regardless of successional status. Both approaches view the plant community as an environmental integrator; the community type approach, however, avoids the presumption of climax. Community types may be either climax types or successional stages leading to a climax type. This is usually what the resource manager must deal with on a day-by-day basis.

Community types are used in this study because aspen is generally regarded as a seral species which is slowly replaced by conifers. Loope and Gruell (1973) determined that nearly all of the aspen clones in the Jackson Hole area of Wyoming had their origin following natural forest fires between 1850 and 1890; most of these stands are now actively succeeding to conifers. Aspen also can be replaced by grasslands or shrublands if regeneration is suppressed (Krebill 1972; Schier 1975). It also is recognized as a climax dominant in parts of western Wyoming (Reed 1971; Beetle 1974). A community type classification will allow resource managers to identify and categorize aspen communities regardless of successional status. These community types can then be linked to existing habitat type classifications, or used as guides in developing such classifications. Meanwhile, the community type classification can be used as a mapping tool and as a basis for resource management planning.

The study area for developing the classification was the entire Bridger-Teton National Forest, with the exception of the Bridger and Teton Wildernesses. These areas were excluded because of travel and time constraints. Aspen is noticeably absent from the upper elevations in these wilderness areas (Reed 1976).

Field Methods

One hundred eighty-six aspen (*Populus tremuloides*) stands were sampled during the summer of 1978. Stands were subjectively chosen to describe as much representative variation as possible. Concentrations of aspen within the study area were first determined from aerial photographs. A schedule was then prepared to optimize the use of time, and yet cover the entire study area. Only stands having 50 percent or more of the canopy consisting of aspen were sampled; those communities having greater than 50 percent of the canopy consisting of conifers were assumed to represent conifer communities sampled by Steel and others (see footnote 1). The normal procedure of stand selection was to travel a preselected route stopping briefly to examine stand composition, and keeping a mileage log of apparent changes. At the end of the travel route the log was inspected and representative stands were selected for sampling. A selected stand was sampled by a single 4,036 ft^2 (375 m^2) plot corrected for slope. The sample plot center was subjectively located within the stand to assure total community representation and avoidance of obvious ecotones that occurred at margins or openings.

Within each sample plot, ocular estimates were made of the canopy coverage of the vascular ground vegetation by species. These ocular estimates were checked for calibration, using a series of 50 microplots and practice layouts of subunits of known percentages. All unknown vascular species were collected for later identification.

Overstory canopy coverage, both total and by species, was also estimated ocularly. The following three size classes were used to evaluate the relative importance of each tree species: less than 3.9 inches (1 dm), 3.9 to 11.8 inches (1 to 3 dm), and greater than 11.8 inches (3 dm) diameter at breast height (d.b.h.). Tree species were also counted by 2.0 inches (0.5 dm) d.b.h. size classes. Trees between 0.3 and 4.5 ft (0.1 and 1.37 m) tall were counted on a 1,076 ft^2 (100 m^2) circular subplot. Seedlings were also counted on this subplot. Age and height of at least three relatively free-growing "dominant" trees of each species were measured in each stand.

For each sample plot, the following environmental factors were recorded: slope, aspect, elevation, position, and configuration. Evidence of the successional status and perturbations were also recorded, including location of conifer seed sources, juxtaposition to neighboring communities, animal and disease disturbances, and fire history. Regolith classes (DeGraff and others 1977) and bedrock for each plot were determined. Neighboring conifer communities were keyed to habitat types according to Steele and others (see footnote 1).

Current aboveground biomass production of the vascular undergrowth on each sample plot was estimated ocularly and compared to a daily reference plot. Undergrowth biomass on the reference plot was determined from a series of three sets of five microplots, each 5.4 ft^2 (0.5 m^2) in area. The three sets were randomly distributed within the 4,036 ft^2 (375 m^2) sample plots, but the five microplots within each set were grouped regularly to provide within-set visibility for ranking estimates. Total current year's biomass on each of four microplots was ranked as a percentage of the fifth. The fifth microplot was then clipped, bagged, and taken to the laboratory for drying. The undergrowth biomass on the four to six sample plots measured on the same day was estimated as a percentage of this daily reference plot. Seasonal variation was accounted for by subjectively rating each sample plot according to the proportion of the expected current year's maximum biomass represented by the existing biomass.

Overstory aboveground biomass was determined from d.b.h. size class data using Zimmermann's (1979) regression equations. *Pinus* and *Pseudotsuga* were treated as *Picea* because of the similarity of growth forms and biomass components.

A separate effort to map conifer habitat types and aspen community types on the Bridger-Teton Forest beginning in the summer of 1979 provided validation of the aspen classification as well as additional insights to successional pathways.

Data Analysis

The goal of the analysis was to develop a community type classification. Three independent approaches, described by Mueller-Dombois and Ellenberg (1974), were merged to form the final classification: similarity indices, cluster analyses, and association tables.

Similarity between stands was computed with Sorenson's K index as used by Dick-Peddie and Moir (1970) and Dyrness and Franklin (1974). Similarity was based upon species canopy cover, with a minimum value of 3 percent qualifying for inclusion. This minimum-value constraint was imposed to eliminate species which could be considered as accidentally occurring with the community. Similarity values range from 0.00 to 1.00, with 1.00 indicating identical species and canopy cover values. A minimum value of 0.30 was selected to signify relatively high concordance; values above 0.30 comprised only 2.13 percent of the total 17,205 comparisons.

A cluster analysis (Sokal and Sneath 1963) of the 186 stands was then performed using the Sorenson's K similarity indices. This analysis was facilitated by using Marshall and Romesburg's (1977) CLUSTAR computer program with the "unweighted pair group method using arithmetic averages." A dendrogram showing the clustering relationships between stands can be found in Youngblood (1979).

The numerical techniques above are largely objective. They, however, fail to recognize vegetation unions and species that might have indicator value for certain environmental conditions, and overweigh species that have broad ecological amplitude. Therefore the association table method (Mueller-Dombois and Ellenberg 1974) was also used because it enables subjective recognition of floristic similarities through species fidelity, constancy, and coverage.

The final groupings for the classification were based on all three methods. The juxtaposition of each sample plot as determined by each method was compared for agreement. Where conflicts arose between placements, the final placement was based upon site characteristics of the different groups.

Average cover and constancy were computed for all species within each of the 26 groups (appendix A1 and A2). A dichotomous key was then developed which would separate each sample plot into its respective group. These groups are considered community types. The community types were named after the dominant and codominant trees in the overstory and the single species that indicate the best representative union of the undergrowth. Overstory and undergrowth names are separated by a slash.

Taxonomic Considerations

The flora of the Bridger-Teton National Forest is very diverse because of wide variability in climatic conditions and the union of at least three major floristic elements (Porter 1962). A Northern Rocky Mountain element enters from southern Montana and Yellowstone National Park and contains species characteristic of the Columbia Plateau. The Great Basin element extends eastward from Utah and southern Idaho, and is found throughout the southern portion of the Forest. A Southern Rocky Mountain element extends northward from Colorado, and is found along the Wind River and Wyoming Ranges.

Nomenclature usually follows Hitchcock and Cronquist (1973); Harrington (1954) was used occasionally when problems arose in the southern portion of the Forest. Taxonomic difficulties were experienced with field identification of a number of species and require clarification for the user of this community type classification.

Symphoricarpos albus and *Symphoricarpos oreophilus* can be difficult to separate unless one notes the small, hollow pith in 1- or 2-year old stems of *S. albus*. The rhizomatous *S. albus* is confined to mesic, forested sites within the northern part of the study area. The somewhat clumpy *S. oreophilus* is more widespread and often occurs on open, drier slopes and ridges.

Positive identification of *Thalictrum fendleri* and *Thalictrum occidentale* depends upon the availability of mature achenes. The dioecious habit of these two species complicates the already difficult situation. Generally, *T. occidentale* is a Northern Rocky Mountain species of cool mesic forests while *T. fendleri* is found more often in the Southern Rockies on warm, moist, and open sites.

Osmorhiza chilensis and *Osmorhiza depauperata* also are nearly impossible to distinguish without mature fruits. These have been combined under the name *O. chilensis,* in the assumption that they are ecologically similar.

In the absence of mature flowers, *Rosa woodsii* and *Rosa nutkana* are difficult to separate because of frequent interspecific hybridization. The morphological characteristic of sepals exceeding 0.8 inch (2 cm) was therefore used to differentiate *R. nutkana* from the smaller flowered *R. woodsii*. *R. woodsii* usually has clustered flowers, while *R. nutkana* is most commonly found with only a solitary flower terminating the lateral branches of the season. These two species are combined for simplicity under *R. woodsii*.

COMMUNITY TYPES

The classification separates three cover type groups into 26 community types. Cover type represents the overstory layer. The name reflects the one or two most dominant overstory species in the community as indicated by amount of canopy cover. Since tree reproduction is an important element reflecting site differences, tree canopy cover for defining "cover type" includes both the overstory and reproduction in the understory. A cover type is considered pure *Populus tremuloides* if there is less than 15 percent canopy cover of either *Pseudotsuga menziesii* or of the combined cover of *Abies lasiocarpa* and *Picea engelmannii*. When either *P. menziesii* or *A. lasiocarpa* and *P. engelmannii* occur with more than 15 percent cover, the cover type name is binomial.

The undergrowth is named after the single species which depicts the most representative union of undergrowth species. It is usually named after one of the undergrowth dominants, but it does not necessarily imply the species with the greatest canopy cover. A listing of community types by cover types is given in table 1.

Table 1.--Aspen community types (c.t.) by cover type groups on the Bridger-Teton National Forest

Populus tremuloides-Abies lasiocarpa cover type
P. tremuloides-A. lasiocarpa/Prunus virginiana c.t.
P. tremuloides-A. lasiocarpa/Ligusticum filicinum c.t.
P. tremuloides-A. lasiocarpa/Pedicularis racemosa c.t.
P. tremuloides-A. lasiocarpa/Berberis repens c.t.
P. tremuloides-A. lasiocarpa/Shepherdia canadensis c.t.
P. tremuloides-A. lasiocarpa/Arnica cordifolia c.t.
P. tremuloides-A. lasiocarpa/Rudbeckia occidentalis c.t.
Populus tremuloides-Pseudotsuga menziesii cover type
P. tremuloides-P. menziesii/Spiraea betulifolia c.t.
P. tremuloides-P. menziesii/Calamagrostis rubescens c.t.
Populus tremuloides cover type
P. tremuloides/Ranunculus alismaefolius c.t.
P. tremuloides/Equisetum arvense c.t.
P. tremuloides/Heracleum lanatum c.t.
P. tremuloides/Prunus virginiana c.t.
P. tremuloides/Ligusticum filicinum c.t.
P. tremuloides/Spiraea betulifolia c.t.
P. tremuloides/Calamagrostis rubescens c.t.
P. tremuloides/Juniperus communis c.t.
P. tremuloides/Berberis repens c.t.
P. tremuloides/Shepherdia canadensis c.t.
P. tremuloides/Arnica cordifolia c.t.
P. tremuloides/Astragalus miser c.t.
P. tremuloides/Thalictrum fendleri c.t.
P. tremuloides/Rudbeckia occidentalis c.t.
P. tremuloides/Artemisia tridentata c.t.
P. tremuloides/Symphonicarpos oreophilus c.t.
P. tremuloides/Wyethia amplexicaulis c.t.

The vegetation key (table 2) can be used to identify the three cover types and the community types within each. Use of this key requires the ability to identify four tree species, eight shrubs, twelve forbs, and two grasses. The key was designed only for those stands where at least 50 percent of the tree canopy cover consists of *Populus tremuloides.* The key is intended for use in aspen communities on the Bridger-Teton National Forest; applicability to other areas has yet to be determined.

A brief description of the general characteristics and noteworthy features of each community type is provided. These descriptions are sequenced in the order in which they appear in the key. Summary tables of constancy and canopy cover of important species within these community types can be found in appendixes A1 and A2. Estimated undergrowth and overstory productivity values are given in appendixes B1, B2, and B3.

The dichotomous key is designed to classify community types from canopy-cover values. Problems encountered in relating the values in the key to the estimated cover for a given aspen stand can usually be resolved by comparing the stand values with the written description and with the constancy-cover data in appendixes A1 and A2.

TYPE DESCRIPTIONS

Populus tremuloides-Abies lasiocarpa/ Prunus virginiana Community Type

(*Potr-Abla/Prvi* c.t.)

A single stand with undergrowth dominated by *Prunus virginiana* and having *Abies lasiocarpa* reproduction is used to tentatively define the *Potr-Abla/Prvi* c.t. It was found in the Salt River Range east of Bedford, Wyo. It occurs on a south-facing slope in the lower portion of the *A. lasiocarpa* zone. This sample plot is believed to be a successional stage which would eventually lead to an *A. lasiocarpa/Berberis repens* climax community (Steele and others, see footnote 1), except for periodic disturbance by snowslides. Floristically, this plot differs from the more common *Potr/Prvi* c.t. by the presence of *A. lasiocarpa* rather than *Pseudotsuga menziesii* in the understory.

Populus tremuloides-Abies lasiocarpa/ Ligusticum filicinum Community Type

(*Potr-Abla/Lifi* c.t.)

The *Potr-Abla/Lifi* c.t. was commonly encountered throughout the Wyoming and Gros Ventre Ranges on a variety of aspects on moderately steep slopes at midelevations in the *Abies lasiocarpa* zone. Sample plots ranged in elevation from 7,850 to 8,050 ft (2 393 to 2 454 m). This community type is believed to be a seral stage leading eventually to either an *A. lasiocarpa/Arnica cordifolia* or *A. lasiocarpa/Ribes montigenum* climax community (Steele and others, see footnote 1). We also regard this community type to be a later stage in development from a *Potr/Lifi* c.t.

The undergrowth of the *Potr-Abla/Lifi* c.t. is structurally and floristically identical to the *Potr/Lifi* c.t.; there appears to be no immediate change in undergrowth as a result of the slow invasion by *Abies lasiocarpa.* The tall forbs that characterize the *Potr-Abla/Lifi* c.t. consist of *Ligusticum filicinum* or *Osmorhiza occidentalis,* commonly associated with *Thalictrum fendleri, Geranium viscosissimum,* and *Rudbeckia occidentalis.* Generally, undergrowth production is moderately high.

The overstory of the *Potr-Abla/Lifi* c.t. is marked by the gradual invasion of *Abies lasiocarpa.* The complete conversion to a mature conifer stand may take several hundred years. Overstory production is characteristically low.

Table 2.--Vegetation key to aspen cover types and community types (c.t.) on the Bridger-Teton National Forest

Key To Cover Types:

I. *Abies lasiocarpa* and/or *Picea engelmannii* present, with at least 15 percent cover.	*Populus tremuloides-Abies lasiocarpa* cover type (Go to A)
I. *A. lasiocarpa* and/or *P. engelmannii* less than 15 percent cover	II
II. *Pseudotsuga menziesii* with at least 15 percent cover	*Populus tremuloides-Pseudotsuga menziesii* cover type (Go to B)
II. *P. menziesii* less than 15 percent cover	*Populus tremuloides* cover type (Go to C)

Key To Community Types:

A. (*Populus tremuloides-Abies lasiocarpa* cover type)

1. *Ranunculus alismaefolius* at least 25 percent cover	Go to C
1. *R. alismaefolius* less than 25 percent cover	2
2. *Prunus virginiana* at least 10 percent cover	*Populus tremuloides-Abies lasiocarpa/Prunus virginiana* c.t. (p. 5)
2. *P. virginiana* less than 10 percent cover	3
3. *Ligusticum filicinum* at least 10 percent cover or *Osmorhiza occidentalis* at least 25 percent cover	*Populus tremuloides-Abies lasiocarpa/Ligusticum filicinum* c.t. (p. 5)
3. *L. filicinum* less than 10 percent cover and *O. occidentalis* less than 25 percent cover	4
4. *Pedicularis racemosa* at least 10 percent cover	*Populus tremuloides-Abies lasiocarpa/Pedicularis racemosa* c.t. (p. 9)
4. *P. racemosa* less than 10 percent cover	5
5. *Berberis repens* at least 10 percent cover or *Pachistima myrsinites* at least 20 percent cover	*Populus tremuloides-Abies lasiocarpa/Berberis repens* c.t. (p. 9)
5. *B. repens* less than 10 percent cover and *P. myrsinites* less than 20 percent cover	6
6. *Shepherdia canadensis* at least 10 percent cover	*Populus tremuloides-Abies lasiocarpa/Shepherdia canadensis* c.t. (p. 9)
6. *S. canadensis* less than 10 percent cover	7
7. *Arnica cordifolia* at least 10 percent cover	*Populus tremuloides-Abies lasiocarpa/Arnica cordifolia* c.t. (p. 10)

Table 2 continued.

7. *A. cordifolia* less than 10 percent cover 8
   8. *Rudbeckia occidentalis* or *Nemophila brevifolia* at least 10 percent cover .... *Populus tremuloides-Abies lasiocarpa/Rudbeckia occidentalis* c.t. (p. 10)
   8. *R. occidentalis* and *N. brevifolia* less than 10 percent cover .... (Return to A, using half the designated cover values.)

B. (*Populus tremuloides-Pseudotsuga menziesii* cover type)
   1. *Spiraea betulifolia* at least 10 percent cover .... *Populus tremuloides-Pseudotsuga menziesii/Spiraea betulifolia* c.t. (p. 11)
   1. *S. betulifolia* less than 10 percent cover 2
      2. *Calamagrostis rubescens* at least 10 percent cover .... *Populus tremuloides-Pseudotsuga menziesii/Calamagrostis rubescens* c.t. (p. 11)
      2. *C. rubescens* less than 10 percent cover .... (Undescribed communities in the cover type.)

C. (*Populus tremuloides* cover type)
   1. *Ranunculus alismaefolius* at least 25 percent cover .... *Populus tremuloides/Ranunculus alismaefolius* c.t. (p. 11)
   1. *R. alismaefolius* less than 25 percent cover 2
      2. *Equisetum arvense* at least 50 percent cover .... *Populus tremuloides/Equisetum arvense* c.t. (p. 12)
      2. *E. arvense* less than 50 percent cover 3
   3. *Heracleum lanatum* at least 10 percent cover .... *Populus tremuloides/Heracleum lanatum* c.t. (p. 12)
   3. *H. lanatum* less than 10 percent cover 4
      4. *Prunus virginiana* at least 15 percent cover .... *Populus tremuloides/Prunus virginiana* c.t. (p. 12)
      4. *P. virginiana* less than 15 percent cover 5
   5. *Ligusticum filicinum* at least 10 percent cover or *Osmorhiza occidentalis* at least 25 percent cover .... *Populus tremuloides/Ligusticum filicinum* c.t. (p. 13)
   5. *L. filicinum* less than 10 percent cover and *O. occidentalis* less than 25 percent cover 6
      6. *Spiraea betulifolia* at least 10 percent cover .... *Populus tremuloides/Spiraea betulifolia* c.t. (p. 14)

Table 2 continued.

6. *S. betulifolia* less than 10 percent cover 7

7. *Calamagrostis rubescens* at least 10 percent cover or *Carex geyeri* at least 25 percent cover .... *Populus tremuloides/ Calamagrostis rubescens* c.t. (p. 14)

7. *C. rubescens* less than 10 percent cover and *C. geyeri* less than 25 percent cover 8

8. *Juniperus communis* at least 25 percent cover .... *Populus tremuloides/ Juniperus communis* c.t. (p. 15)

8. *J. communis* less than 25 percent cover 9

9. *Berberis repens* at least 10 percent cover .... *Populus tremuloides/ Berberis repens* c.t. (p. 15)

9. *B. repens* less than 10 percent cover 10

10. *Shepherdia canadensis* at least 10 percent cover .... *Populus tremuloides/ Shepherdia canadensis* c.t. (p. 16)

10. *S. canadensis* less than 10 percent cover 11

11. *Arnica cordifolia* at least 15 percent cover .... *Populus tremuloides/ Arnica cordifolia* c.t. (p. 16)

11. *A. cordifolia* less than 15 percent cover 12

12. *Astragalus miser* at least 10 percent cover .... *Populus tremuloides/ Astragalus miser* c.t. (p. 16)

12. *A miser* less than 10 percent cover 13

13. *Thalictrum fendleri* at least 15 percent cover .... *Populus tremuloides/ Thalictrum fendleri* c.t. (p. 18)

13. *T. fendleri* less than 15 percent cover 14

14. *Rudbeckia occidentalis* or *Nemophila brevifolia* at least 10 percent cover .... *Populus tremuloides/ Rudbeckia occidentalis* c.t. (p. 19)

14. *R. occidentalis* and *N. brevifolia* less than 10 percent cover 15

15. *Artemisia tridentata* at least 10 percent cover .... *Populus tremuloides/ Artemisia tridentata* c.t. (p. 19)

15. *A. tridentata* less than 10 percent cover 16

16. *Symphoricarpos oreophilus* at least 10 percent cover .... *Populus tremuloides/ Symphoricarpos oreophilus* c.t. (p. 19)

16. *S. oreophilus* less than 10 percent cover 17

Table 2 continued.

17. *Wyethia amplexicaulis* at least 10 percent cover .... *Populus tremuloides/ Wyethia amplexicaulis* c.t. (p. 20)

17. *W. amplexicaulis* less than 10 percent cover .... (Undescribed communities, (p. 21)

Populus tremuloides-Abies lasiocarpa/ Pedicularis racemosa Community Type

(*Potr-Abla/Pera* c.t.)

The *Potr-Abla/Pera* c.t. is a minor type found in the southern portion of the Wyoming and Salt River Ranges. It occurs at upper elevations in the *Abies lasiocarpa* zone; the sample plots ranged from 7,900 to 8,600 ft (2 408 to 2 622 m) in elevation. It is most commonly found on cool, northern aspects and moderately steep terrain. We believe this community type is a successional stage leading to an *A. lasiocarpa/Pedicularis racemosa* climax. Neighboring communities are usually mature conifer stands which belong to the *A. lasiocarpa/P. racemosa* habitat type. The *Potr-Abla/Pera* c.t. may be more common farther south and west in the Caribou and Wasatch National Forests, where Henderson and others (1976) and Steele and others (see footnote 1) found the *Abla/Pera* habitat type more abundant.

The *Potr-Abla/Pera* c.t. is recognized on the basis of having a sparse forb layer dominated by the indicator species, *Pedicularis racemosa*. The otherwise impoverished undergrowth may consist of traces of *Arnica cordifolia, Carex rossii, Symphoricarpos oreophilus, Shepherdia canadensis,* and *Pachistima myrsinites*. Average productivity of undergrowth is low.

Abies lasiocarpa regenerates quickly in the *Potr-Abla/Pera* c.t. *Picea engelmannii* may also be present. Within the *Abla/Pera* habitat type, *Picea engelmannii* and sometimes *Pseudotsuga menziesii* are common seral trees (Steele and others, see footnote 1). Overstory productivity appears to be fairly high.

Deer use the *Potr-Abla/Pera* c.t. for summer cover; moose browse the *Abies* reproduction in winter which can slow conifer invasions. This type appears to have little or no value for domestic grazing.

Populus tremuloides-Abies lasiocarpa/ Berberis repens Community Type

(*Potr-Abla/Bere* c.t.)

The *Potr-Abla/Bere* c.t. was found scattered throughout the Salt River Range and Wyoming Range portions of the Forest. Sample plots were on relatively gentle terrain, on all but northern exposures, and at elevations ranging from 5,900 to 8,700 ft (1 800 to 2 652 m). Several sample plots in the Wyoming Range were in communities maintained in a seral condition through repeated snowslides.

This community type is considered an intermediate successional stage leading to the climax *Abies lasiocarpa/Berberis repens* type described by Steele and others (see footnote 1). It is similar to the *Potr/Bere* c.t. which is considered an earlier stage in the sere. *Berberis repens* dominates a low shrub layer in the *Potr-Abla/Bere* c.t. *Pachistima myrsinites* is more common here and has a slightly higher coverage than in the *Potr/Bere* c.t. Other undergrowth characteristics are shared with the *Potr/Bere* c.t. The increased presence of *A. lasiocarpa* or *Picea engelmannii* distinguish this type from the *Potr/Bere* c.t.

Productivity appears to decrease with the increase of *Abies lasiocarpa* in the *Potr-Abla/Bere* c.t. when compared to the *Potr/Bere* c.t. This decrease may be the result of an increase in competition for light and moisture. Undergrowth and overstory productivity in the *Potr-Abla/Bere* c.t. are generally low.

Kerr and Henderson (1979) describe an *Abies lasiocarpa-Populus tremuloides/Berberis repens* community for the Manti-LaSal National Forest in Utah. Their type is very similar to the *Potr-Abla/Bere* c.t. It differs only in the relative proportion of conifers in the overstory, and a larger forb component in the undergrowth.

Populus tremuloides-Abies lasiocarpa/ Shepherdia canadensis Community Type

(*Potr-Abla/Shca* c.t.)

The *Potr-Abla/Shca* c.t. (fig. 2) was found throughout the Gros Ventre Range and in the northern portion of the Wyoming Range. It usually occurs on northerly exposures, on moderately steep slopes, and at elevations varying from approximately 7,050 to 8,300 ft (2 149 to 2 530 m). Surrounding communities are usually seral or mature conifer stands belonging to the *Abies lasiocarpa/Arnica cordifolia* habitat type (Steele and others, see footnote 1).

This community type is closely related to the *Potr/Shca* c.t., and is considered a later stage in succession which will eventually lead to an *Abies lasiocarpa/ Arnica cordifolia* climax community. The presence of either *A. lasiocarpa* or *Picea engelmannii* as codominant with *Populus tremuloides* in the overstory marks the principle difference between the *Potr-Abla/Shca* c.t. and *Potr/Shca* c.t. *Pinus contorta* may also be present but demonstrates little potential for fully occupying these sites. A comparison of constancy and canopy cover data (appendixes A1 and A2) indicates that as succession proceeds from a *Potr/Shca* c.t. to a *Potr-Abla/Shca* c.t., such species as *Rosa woodsii, Bromus ciliatus, Epilobium angustifolium, Fragaria vesca, Geranium viscosissimum,* and *Lupinus argenteus* tend to decrease in abundance.

Figure 2.--Populus tremuloides-Abies lasiocarpa/Shepherdia canadensis *community type in the Hoback River drainage, Gros Ventre Range.*

Big game, especially elk and moose, appear to utilize this type extensively. Browsing by moose often tends to suppress the growth of *Abies lasiocarpa* and subsequently slows succession.

Populus tremuloides-Abies lasiocarpa/ Arnica cordifolia Community Type

(*Potr-Abla/Arco* c.t.)

At the southern end of the Forest, three stands were examined which were subsequentially categorized as the *Potr-Abla/Arco* c.t. This type occurs primarily on northerly exposures and is believed to represent an intermediate stage in succession between the early seral *Potr/Arco* c.t. and an *Abies lasiocarpa/Arnica cordifolia* climax.

The presence of *Abies lasiocarpa* as a codominant species in the canopy is the primary distinction between the *Potr-Abla/Arco* c.t. and *Potr/Arco* c.t. Undergrowth of both community types is dominated by *Arnica cordifolia*. The undergrowth of the *Potr-Abla/Arco* c.t., however, has more *Carex rossii* and *Osmorhiza chilensis*, and less *Symphoricarpos oreophilus* than the *Potr/Arco* c.t. Undergrowth productivity here was lowest of all classified types, whereas overstory productivity was moderate to high.

Ruffed grouse apparently find communities within this type acceptable for nesting sites, probably because of variability in tree diameter classes which provides abundant overhead cover.

Populus tremuloides-Abies lasiocarpa/ Rudbeckia occidentalis Community Type

(*Potr-Abla/Ruoc* c.t.)

The *Potr-Abla/Ruoc* c.t. is a later seral stage of the more common *Potr/Ruoc* c.t. It is found on the same variety of aspects and slopes as the *Potr/Ruoc* c.t., although the elevational range of 8,100 to 8,450 ft (2 469 to 2 576 m) is slightly higher, resulting in more successful conifer establishment. More mesic sites that abut the *Potr-Abla/Ruoc* c.t. are mature conifer stands in the *Abies lasiocarpa/Arnica cordifolia* habitat type (Steele and others, see footnote 1), while drier communities are *Artemisia* steppe or the *Potr/Syor* c.t.

The undergrowth of the *Potr-Abla/Ruoc* c.t. usually lacks a shrub layer and graminoid species have low constancy. The prominence of *Rudbeckia occidentalis*, which helps define the type, is believed to be at least partially caused by abusive grazing. The average undergrowth biomass of the stands examined was low.

Picea engelmannii and *Abies lasiocarpa* represent the climax overstory species. There is a high degree of vigor of conifer growth in the *Potr-Abla/Ruoc* c.t. due to the mesic site characteristics and the normally deep soil profile.

Kerr and Henderson (1979) have previously described an *Abies lasiocarpa-Populus tremuloides/Rudbeckia occidentalis-Sambucus racemosa* community type from central Utah.

Populus tremuloides-Pseudotsuga menziesii/Spiraea betulifolia Community Type

(*Potr-Psme/Spbe* c.t.)

The *Potr-Psme/Spbe* c.t. is a later seral stage of the more commonly found *Potr/Spbe* c.t. It occurs at middle to low elevations within the *Pseudotsuga menziesii* zone in the lower Greys and Snake River drainages, more commonly on the cooler, northerly slopes than the *Potr/Spbe* c.t.

Pseudotsuga menziesii is a slow invader in the *Potr-Psme/Spbe* c.t. The scattered individuals present should do little to change the floristic composition of the undergrowth. It may take several hundred years for *P. menziesii* to completely dominate the site, and any periodic fire, especially when the *P. menziesii* are still fairly young, will serve to prolong the occupation of the site by *Populus tremuloides.* Barring such disturbance, this community type will probably succeed to a *P. menziesii/Spiraea betulifolia* or possibly a *P. menziesii/Symphoricarpos albus* climax.

The undergrowth of the *Potr-Psme/Spbe* c.t. is identical to that of the *Potr/Spbe* c.t. Multiple layers of shrubs account for almost all the ground cover. A single sample plot having a dominance of *Physocarpus malvaceus,* along with the indicator *Spiraea betulifolia,* may be an intergrade between the more mesic *Pseudotsuga menziesii/P. malvaceus* and the warmer *Pseudotsuga menziesii/S. betulifolia* habitat types described by Steele and others (see footnote 1).

Annual production of the undergrowth and overstory averaged moderate to high in this type.

Populus tremuloides-Pseudotsuga menziesii/Calamagrostis rubescens, Community Type

(*Potr-Psme/Caru* c.t.)

The *Potr-Psme/Caru* c.t. is a minor type on the Bridger-Teton Forest. It occurs at low elevations in the *Pseudotsuga menziesii* zone along the Buffalo and Hoback Rivers. The sample plots ranged in elevation from 6,600 to 7,770 ft (2 012 to 2 368 m) on northern aspects, and had moderately steep slopes.

This community type is considered an intermediate successional stage between an early seral *Potr/Caru* c.t. and the climax *Psme/Caru* type found in the area (Steele and others, see footnote 1). The establishment of *Pseudotsuga menziesii* in the canopy marks the distinguishable difference between the *Potr-Psme/Caru* c.t. and the earlier seral *Potr/Caru* c.t. This type usually occurs because of fires that remove the *P. menziesii* overstory and promote vigorous suckering of *Populus tremuloides. Pseudotsuga menziesii* becomes established again about 50 years after the *P. tremuloides* canopy closes. More rapid seedling establishment is presumably prevented because of the thick *Calamagrostis rubescens* sod and drought. Average overstory production is low to moderate.

The undergrowth in the *Potr-Psme/Caru* c.t. is generally indistinguishable from that of the *Potr/Caru* c.t. *Calamagrostis rubescens* creates a sward and represents most of the total ground cover. *Aster conspicuus* may occur with relatively high coverages, and *Thalictrum fendleri, Epilobium angustifolium,* and *Fragaria vesca* have high constancy. Undergrowth production is very high.

Climax *Pseudotsuga menziesii/Calamagrostis rubescens* communities are widespread throughout much of central and southern Idaho, western Wyoming, and northern Utah (Steele and others, see footnote 1; Henderson and others 1976). Steele found several communities on the Caribou National Forest in southeastern Idaho dominated by *Populus tremuloides* with an understory of *C. rubescens* in which he considered *P. menziesii* to be climax. Cooper (1975) sampled similar communities on the Targhee National Forest just west of the Bridger-Teton Forest.

Populus tremuloides/Ranunculus alismaefolius Community Type

(*Potr/Raal* c.t.)

This is a localized edaphic type found in moist depressions along streams or seepage areas. It is found at high elevations in the *Abies lasiocarpa* zone along the Wyoming Range. Sample plots ranged from 8,400 to 8,700 ft (2 560 to 2 652 m) elevation and had either eastern or western aspects. The type appears to be associated with grazing disturbance on gentle slopes or flat benches with a high water table. The underground moisture may result from late melting snowbanks that feed natural seepages. Alluvial deposits of fine-textured silts and clays accumulate to form deep layers of organic muck. Adjacent upland communities frequently belong to the *Abies lasiocarpa/Ribes montigenum* habitat type (Steele and others, see footnote 1). Open forb meadows of *Wyethia amplexicaulis* or tall forbs may also border the type. The *Potr/Raal* c.t. is usually confined to areas of less than 1.24 acres (0.5 ha).

The type is characterized by having a high coverage of the indicator species *Ranunculus alismaefolius.* Shrubs are absent, except for scattered *Ribes montigenum* or *Lonicera involucrata* on raised hummocks. *Carex microptera* or *Carex aquatilis* may be found in areas of surface water. Other forbs that may be found include *Trifolium longipes* and *Claytonia lanceolata.* Because the *Potr/Raal* c.t. is easily disturbed by either sheep or cattle, *Rudbeckia occidentalis* or *Nemophila brevifolia* may also occur.

The successional status of the *Potr/Raal* c.t. is unclear. *Abies lasiocarpa* and *Picea engelmannii* are present outside the areas of high ground water, either on raised hummocks or adjacent slopes. *Populus tremuloides* reproduces successfully as evidenced by multiple age classes on the sample plots. Given a time span of several hundred years, *A. lasiocarpa* may eventually colonize enough hummocks and raised microsites to lower the water table, allowing more rapid conifer invasion. Any disturbance might offset the invasion and prolong the *Potr/Raal* c.t.

Populus tremuloides/Spiraea betulifolia Community Type

(*Potr/Spbe* c.t.)

This community type is usually found along the lower Snake and Greys Rivers, in the lower to middle *Pseudotsuga* zone. Sample plots ranged in elevation from 5,750 to 6,100 ft (1 753 to 1 859 m). It normally occupies north to west aspects on fairly steep slopes, but can occur on southern aspects with more gentle slopes. Surrounding communities usually belong to the *Pseudotsuga menziesii/Spiraea betulifolia* habitat type on warm slopes and to the *P. menziesii/Symphoricarpos albus* or *P. menziesii/Physocarpus malvaceus* habitat types (Steele and others, see footnote 1) on more northern aspects.

The *Potr/Spbe* c.t. has a dominant multilayered shrub component and a minor forb and grass component (fig. 4). It is characterized by the high constancy and coverage of *Spiraea betulifolia,* but this may be overtopped by *Amelanchier alnifolia, Symphoricarpos albus, Rosa woodsii,* or *Prunus virginiana.* A third layer of *Pachistima myrsinites* or *Berberis repens* may underlie the *S. betulifolia. Smilacina stellata, Thalictrum fendleri,* and *Calamagrostis rubescens* may be present with low coverages.

Pseudotsuga menziesii seedlings or small saplings are usually present and should eventually dominate the site. When this conifer is abundant enough to begin influencing the site, a later seral stage, the *Potr-Psme/Spbe* c.t. is recognized. Cooper (1975) considered similar communities on the Targhee National Forest in eastern Idaho to be seral to his broadly defined *P. menziesii/Symphoricarpos albus* habitat type.

Undergrowth productivity is high, reflecting the dominance of dense shrubs, while overstory production of *Populus tremuloides* is only moderate.

Populus tremuloides/Calamagrostis rubescens Community Type

(*Potr/Caru* c.t.)

The *Potr/Caru* c.t. is the most widespread type described by this study. It is found throughout the Gros Ventre, Hoback, and the Teton Ranges and along the west flank of the Wyoming and Salt River Ranges. The type also extends westward along the Snake River into Idaho. It appears to reach its optimum development in the Spread Creek area of the Gros Ventre Range. The *Potr/Caru* c.t. is found on a variety of aspects and slopes, although it occurs most often on lower slopes or flat alluvial benches with northern aspects, sites which are usually cool and dry. The sample plots ranged in elevation from 6,200 to 8,500 ft (1 890 to 2 591 m) and occurred on moderately steep slopes. Soil parent materials include glacial tills along the Buffalo River and Spread Creek, alluvial benches along the Gros Ventre and Hoback Rivers, and colluvial deposits of sandstone and shale in the southern areas.

The *Potr/Caru* c.t. often appears as fairly large, homogeneous stands of *Populus tremuloides.* It usually occurs within the middle to lower *Pseudotsuga menziesii* zone and may border mature *P. menziesii* stands belonging to the *P. menziesii/Calamagrostis rubescens* habitat type (Steele and others, see footnote 1). It may also occur as isolated groves in the lower timberline zone and be surrounded by *Artemisia* steppe. When *Abies lasiocarpa* represents the lowest conifer in the area, neighboring communities may belong to either the *A. lasiocarpa/C. rubescens* community type or the *A. lasiocarpa/Berberis repens* habitat types (Steele and others, see footnote 1).

The undergrowth of the *Potr/Caru* c.t. is characterized by a dense sward of the indicator species, *Calamagrostis rubescens.* Either *Elymus glaucus* or *Bromus ciliatus* may be mixed with the *C. rubescens.* Along the Salt River

Figure 4.--Populus tremuloides/Spiraea betulifolia *community type along the Snake River near Alpine, Wyoming.*

Range, *C. rubescens* may alternate in dominance with *Carex geyeri*. Often a low shrub layer, consisting of *Rosa woodsii, Symphoricarpos oreophilus, Berberis repens*, or *Amelanchier alnifolia* may overtop the graminoids. Forbs are usually sparse, although *Thalictrum fendleri, Geranium viscosissimum, Aster conspicuus*, and *Lupinus argenteus* have fairly high constancy.

This type represents a confusing mixture of successional trends. Along the lower Buffalo and Hoback Rivers, *Pseudotsuga menziesii* is found as seedlings or saplings and should represent the climax overstory. Sites within the Salt River and Wyoming Ranges and in the upper Gros Ventre drainage are potentially *Abies lasiocarpa* climax. A broad band along the lower western flank of the Gros Ventre Range contains communities that appear stable. In these stable communities, which are floristically indistinguishable from the seral phases of the *Potr/Caru* c.t., *Populus tremuloides* has multiple age classes and there is no evidence of conifer invasion despite abundant seed sources nearby. These stable sites are presumably too warm for *A. lasiocarpa*, and lack the calcareous substrate necessary for successful *P. menziesii* establishment (Steele and others, see footnote 1). In other areas where *P. menziesii* is well represented in the canopy, a later seral stage is recognized as the *Potr-Psme/Caru* c.t. *Pinus contorta* and *Pinus flexilus* may be present on any of the phases as minor seral associates. On sites that are potentially conifer climax, seedling establishment is severely restricted by the thick *Calamagrostis rubescens* sod.

The *Potr/Caru* c.t. produces moderate to high amounts of undergrowth biomass, which consists almost entirely of grasses. Overstory production is highly variable, probably because of variation in both successional trends and site characteristics.

Cooper (1975) sampled several *Populus tremuloides* communities in the Targhee National Forest and in Grand Teton and Yellowstone National Parks which were dominated by *Calamagrostis rubescens*. This grass is notably absent from the Wind River Range (Steele and others, see footnote 1); (Reed 1971), but occurs frequently in eastern Idaho and northern Utah. Henderson and others (1976) reports the long persistence of *Populus tremuloides* as a seral tree in the *Pseudotsuga menziesii/C. rubescens* habitat type in northern Utah.

Populus tremuloides/Juniperus communis Community Type

(*Potr/Juco* c.t.)

This is a minor, local type which may be the result of cold air drainages. Examples of the type were found only along the lowest flank of the Wind River Range, on northerly exposures, and at elevations from 8,100 to 8,140 ft (2 469 to 2 481 m). Surrounding communities on drier sites were either the *Potr/Syor* c.t. or open *Artemisia* steppes. The type is usually below the lower timberline for successful conifer establishment. Glacial tills or boulder fields form the substrate.

A high coverage of *Juniperus communis* characterizes the type. A second layer of low shrubs includes *Pachistima myrsinites, Berberis repens*, and *Arctostaphylos uva-ursi*. Forbs and graminoids are not abundant.

The *Potr/Juco* c.t. consists of essentially pure stands of *Populus tremuloides*. Scattered *Pinus contorta* or *Pinus flexilis* may be present in the stand, but represent little successional change.

A *Potr/Juco* habitat type was described by Henderson and others (1977) as occurring on the north slope of the Uinta Mountains in northern Utah. The *Potr/Juco* c.t. along the Wind River Range appears to be an extension of the Uinta *Potr/Juco* habitat type.

Populus tremuloides/Berberis repens Community Type

(*Potr/Bere* c.t.)

The *Potr/Bere* c.t. is widespread throughout the Bridger-Teton National Forest. Examples were found most often scattered along the Wyoming and Wind River Ranges. It is noticeably absent from the Gros Ventre drainage. The type is normally found on gentle to moderately steep terrain on all except northerly aspects. It typically occurs in the lower portion of the *Abies lasiocarpa* zone, but sample plots ranged in elevation from 5,620 to 9,150 ft (1 713 to 2 789 m) and averaged 7,851 ft (2 393 m). These sites are characteristically cool and dry. Soil parent materials vary from coarse, poorly consolidated colluvial sandstones to glaciated tills and alluvial benches. The surrounding vegetation is usually coniferous forests which belong to the *A. lasiocarpa/ Berberis repens* habitat type or, on drier sites at lower elevations, the *Pseudotsuga menziesii/B. repens* habitat described by Steele and others (see footnote 1). Nonforested communities dominated by *Artemisia* may also abut this type.

A low shrub layer dominates the undergrowth in the *Potr/Bere* c.t. *Berberis repens* usually has the highest coverage, and is used as indicator species. *Pachistima myrsinites* may be a codominant but usually is more abundant in the closely related *Potr-Abla/Bere* c.t. *Rosa woodsii, Shepherdia canadensis*, and *Symphoricarpos oreophilus* may also occur, but with low coverages. Occasionally this low shrub layer may be overtopped by either *Acer grandidentatum, Amelanchier alnifolia*, or *Prunus virginiana*. A variety of forbs and graminoids may be present under the shrub canopy, but only *Thalictrum fendleri, Geranium viscosissimum*, and *Achillea millifolium* have high constancy.

Populus tremuloides usually forms an even-aged overstory in this type. *Pinus flexilis* and *Pinus contorta* are usually present as seedling or sapling and share a seral status with *P. tremuloides*. In the northern part of the Gros Ventre Range and along the Snake River where calcareous deposits are present, *Pseudotsuga menziesii* may be present in the type. *Abies lasiocarpa* is usually present as seedlings and represents the potential climax overstory. As succession proceeds, this type merges into the *Potr-Abla/Bere* c.t., which differs in the amount of *A. lasiocarpa* in the overstory.

The *Potr/Bere* c.t. is a relatively poor to moderate producer of undergrowth biomass, presumably because of the dryness of these sites. This annual production is composed almost entirely of shrubs. The overstory is moderate to high in production.

Kerr and Henderson (1979) describe a *Potr/Syor-Bere* habitat type as a minor type on the Manti-LaSal National Forest. Their type is considered stable, and is characterized by a union of *Symphoricarpos oreophilus, Berberis repens, Pachistima myrsinites,* and *Rosa nutkana.* It was found at high elevations on west or southwest aspects. Reed (1971) includes *B. repens* in his stable, broadly defined *Populus tremuloides/S. oreophilus* habitat type in the Wind Rivers. The *Potr/Bere* community type of the Bridger-Teton National Forest differs from these types in being an early seral stage of the *Abies lasiocarpa/ B. repens* habitat type (Steele and others, see footnote 1) and having a shrub union which is not dominated by *S. oreophilus.* A separate *Potr/Syor* c.t. is characteristically stable and found on southwest or southeast aspects.

Populus tremuloides/Shepherdia canadensis Community Type

(*Potr/Shca* c.t.)

The *Potr/Shca* c.t. was found scattered throughout the Gros Ventre drainage at midelevations in the *Abies lasiocarpa* zone, but may also occur within the Hoback and northern portion of the Wyoming Range. This type is confined to cool and moist northerly aspects with moderately steep terrain. The sample plots ranged from 7,500 to 7,880 ft (2 286 to 2 402 m) in elevation, but the type extends much higher. Surrounding vegetation is usually mature conifer stands on cool slopes belonging to the *A. lasiocarpa/Arnica cordifolia* habitat type (Steele and others, see footnote 1), or shrub and forb meadow communities on toe slopes.

Shepherdia canadensis dominates the undergrowth in the *Potr/Shca* c.t. *Bromus ciliatus* may occur with high constancy, and forbs are usually dense, creating a second layer under the shrub canopy. *Geranium viscosissimum, Pedicularis bracteosa, Galium boreale, Thalictrum fendleri,* and *Lupinus argenteus* are often abundant. Annual production of the undergrowth is moderate.

Abies lasiocarpa and *Picea engelmannii* regenerate easily within the *Potr/Shca* c.t. Eventually, the type will probably succeed to an *A. lasiocarpa/Arnica cordifolia* climax. *Pinus flexilis* is a common seral tree. Overstory production is moderate.

Big game appear to concentrate more in the *Potr/Shca* c.t. than other *Populus* community types in the same area. *Populus tremuloides* suckers were heavily utilized, the branches highlined, and the bark of many mature stems was severely damaged by elk. In areas close to winter feed lots, elk have also highlined *Abies lasiocarpa* and *Picea engelmannii.* Moose also have hampered the invasion of *A. lasiocarpa;* the gradual increase of *Pinus flexilis* may serve to protect the *Abies* seedlings from browsing and signify a change in composition in favor of more rapid *Abies* establishment.

Populus tremuloides/Arnica cordifolia Community Type

(*Potr/Arco* c.t.)

The *Potr/Arco* c.t. is commonly found throughout the southern portion of the Wyoming and Salt River Ranges where it occupies a variety of aspects and elevations on gentle to moderately steep terrain. The sample plots ranged in elevation from 7,590 to 9,020 ft (2 313 to 2 749 m), but this type appears more prevalent in the lower portion of the *Abies lasiocarpa* zone. Surrounding vegetation may vary, depending upon the specific site characteristics. Upper elevational communities are usually surrounded by conifer stands in various stages of succession. Conifer-dominated sites on southern or eastern aspects usually belong to the *A. lasiocarpa/Arnica cordifolia* habitat type, while those on more northern slopes might fit the *A. lasiocarpa/Ribes montigenum* or *A. lasiocarpa/ Pedicularis racemosa* habitat type of Steele and others (see footnote 1). Lower elevational communities border either conifer stands or *Artemisia* steppes. The *Potr/Arco* c.t. is found on a variety of substrates, including colluvial deposits of sandstone or shale, glacial tills, and alluvium.

Arnica cordifolia dominates the sparse undergrowth. *Symphoricarpos oreophilus* is the only shrub that might be present. *Carex rossii* and *Poa nervosa* occur with a high constancy, but usually have low coverages. *Geranium viscosissimum* and *Achillea millfolium* are the only other forbs that are regular associates.

Abies lasiocarpa usually becomes established in the *Potr/Arco* c.t., and represents the climax overstory. *Pinus contorta* is present as a minor associate, usually as a result of fires. When *A. lasiocarpa* becomes increasingly important in the understory, a later seral stage is recognized as the *Potr-Abla/Arco* c.t.

The *Potr/Arco* c.t. is one of the least productive communities for undergrowth. The overstory is only moderately productive.

Populus tremuloides/Astragalus miser Community Type

(*Potr/Asmi* c.t.)

The *Potr/Asmi* c.t. is found in the northern Wind River Range and in the Gros Ventre drainage. Elevations of the sample plots range from 7,500 to 8,900 ft (2 286 to 2 713 m). The type usually occurs on south or west aspects with moderately steep slopes. Soils are usually glaciated tills. The type may be bordered by *Artemisia* steppe, or by the *Potr/Thfe* c.t. on drier slopes. Nearby conifer stands usually belong to the *Abies lasiocarpa/Arnica cordifolia* habitat type, *Astragalus miser* phase, or the *Pinus contorta/ A. cordifolia* community type (Steele and others, see footnote 1).

The *Potr/Asmi* c.t. is differentiated by the dominant forb layer of *Astragalus miser* (fig. 5). This single species either may account for almost all of the ground cover or there may be moderate amounts of *Lupinus argenteus, Thalictrum fendleri,* or *Geranium viscosissimum.* Several dry-site graminoids, such as *Leucopoa kingii, Tristeum spicatum, Festuca idahoensis,* and *Carex rossii,* may also be present, but only in small amounts. Undergrowth productivity is usually low.

Figure 5.--Populus tremuloides/Astragalus miser *community type in the Wind River Range north of the Green River.*

Pinus flexilis has a high constancy in the *Potr/Asmi* c.t., but a low average cover. Both *Abies lasiocarpa* and *Picea engelmannii* may be present as seedlings, but show little potential for rapid colonization of the site. *Populus tremuloides* had an even-aged stand structure on all of the sample plots. Overstory productivity appears moderate. This community type appears to be the result of periodic fires that maintain the *Populus* groves, coupled with environmental characteristics that retard conifer invasion. Thus it is regarded as a stable type.

The type is used extensively by both deer and elk. *Populus* stems on many sample plots had severe damage from elk chewing and scraping the bark. This damage probably occurs during winter months when the herds use these south-facing stands for cover.

Populus tremuloides/Thalictrum fendleri Community Type

(*Potr/Thfe* c.t.)

The *Potr/Thfe* c.t. can be found on the northern portion of the Wind River and Wyoming Ranges. It appears to occur only on glaciated till or on coarse sandstones with quartzite conglomerate. It occurs on a variety of slopes with southern aspects in the lower portion of the *Abies lasiocarpa* zone. Sample plots ranged in elevation from 7,420 to 9,120 ft (2 262 to 2 780 m). The *Potr/Thfe* c.t. is usually the lowest forest type in the immediate area and is often adjacent to *Artemisia* steppe. Along the Wyoming Range, the *Potr/Thfe* c.t. may abut the slightly cooler *Potr/Bere* c.t. or border conifer stands belonging to the *A. lasiocarpa/Berberis repens* or *A. lasiocarpa/Arnica cordifolia* habitat types (Steele and others, see footnote 1).

The undergrowth in the *Potr/Thfe* c.t. is characteristically dominated by low forbs (fig. 6), and at times appears sparse. *Rosa woodsii* and *Symphoricarpos oreophilus* usually occur, but only in minor amounts. Several grasses, including *Festuca idahoensis, Poa ampla, Stipa lettermannii,* and *Trisetum spicatum* have high constancy, but the canopy cover of all graminoids in a sample plot is usually less than 5 percent. Forbs are the predominant component, but only *Thalictrum fendleri* has both a high constancy and an average cover exceeding 20 percent.

Overstory in the *Potr/Thfe* c.t. consists entirely of *Populus tremuloides*. Although *Abies lasiocarpa* and *Picea engelmannii* seed sources may be nearby, seedlings of these conifers seem unable to withstand the moisture stress on these sites. *P. tremuloides* is even-aged, and many of the sample plots contained charcoal in the soil, indicating a history of fires. The relative stability of this community type is uncertain.

Big game use the *Potr/Thfe* c.t. extensively. Many of the sample plots had bark damage from browsing by elk or deer. These sites are on winter ranges and sucker utilization is very heavy.

This type has one of the lowest amounts of undergrowth production. There may be wide variation in production depending upon the previous grazing disturbances. Overstory production is moderate to high.

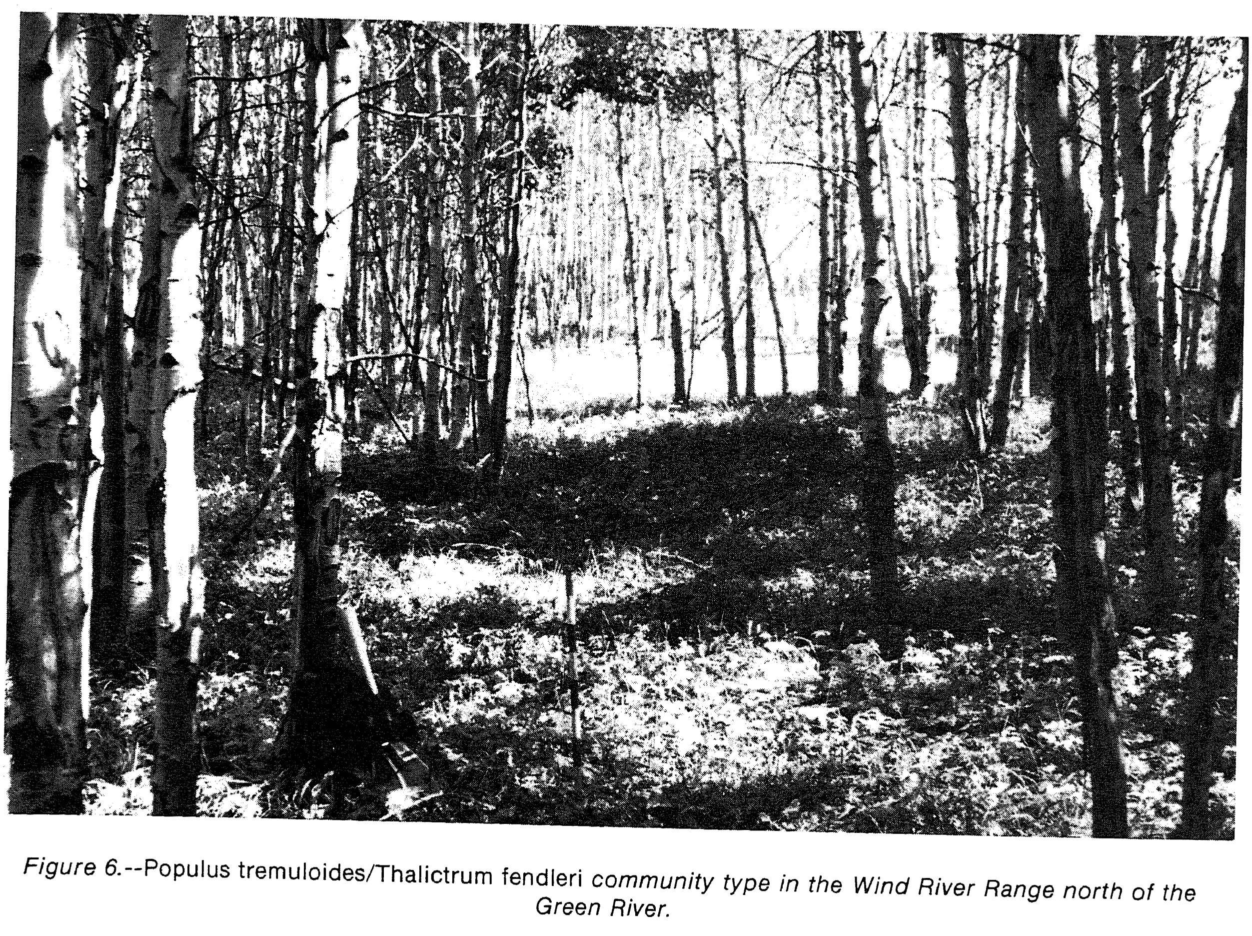

Figure 6.--Populus tremuloides/Thalictrum fendleri *community type in the Wind River Range north of the Green River.*

Populus tremuloides/Rudbeckia occidentalis Community Type

(*Potr/Ruoc* c.t.)

The *Potr/Ruoc* c.t. occurs along the Wyoming Range on a variety of aspects and elevations within the *Abies lasiocarpa* zone, on gentle slopes as well as on flat alluvial terraces. The sample plots ranged in elevation from 6,850 to 8,310 ft (2 088 to 2 534 m). The type appears most often on sandstone and shale substrates. Adjacent communities vary from *Potr/Lifi* c.t., *Potr/Hela* c.t., *Potr/Wyam* c.t., and the *A. lasiocarpa/Arnica cordifolia* habitat type in the southern portion of the Forest to the *Pinus contorta/Calamagrostis rubescens* community type (Steele and others, see footnote 1) and the *Artemisia* steppes along the Hoback drainage.

The *Potr/Ruoc* c.t. is a collection of several different communities that have been heavily disturbed by grazing. The undergrowth is characterized by a high coverage of either *Rudbeckia occidentalis* or *Nemophila brevifolia*. Both are indicators of overgrazing (Houston 1954). Additional undergrowth species vary, depending upon the natural flora of the site. *Achillea millefolium, Geranium viscosissimum,* and *Collomia linearis* have high constancy but low coverage; *Melica spectabilis* usually has both high constancy and coverage.

The *Potr/Ruoc* c.t. appears restricted to sites with moderately deep soil that have been repeatedly disturbed by cattle or sheep grazing. Fertilization with nitrogen (livestock manure) appears to prolong vigorous *Rudbeckia* growth and abundant flowering and seed set (Florez 1971). The type produces moderately high undergrowth biomass, but this is usually composed of a high percentage of *Rudbeckia occidentalis,* which may have no value for domestic stock or wildlife.

The type will usually support *Abies lasiocarpa* reproduction if grazing is not heavy. As *A. lasiocarpa* increases, the community succeeds to a *Potr-Abla/Ruoc* c.t. Moose, however, can severely restrict the growth of *A. lasiocarpa* reproduction in this type.

A *Populus tremuloides/Sambucus racemosa-Rudbeckia occidentalis* community type has been described from central Utah (Kerr and Henderson 1979) which closely resembles this *Potr/Ruoc* c.t. *Sambucus racemosa* is noticeably absent from *P. tremuloides* communities on the Bridger-Teton Forest, although it occurs on moist road cuts and on recently logged timber sale areas.

Populus tremuloides/Artemisia tridentata Community Type

(*Potr/Artr* c.t.)

The *Potr/Artr* c.t. was found at the lower timberline zone along the southern portion of the Wyoming Range and probably represents an ecotone between the adjacent *Potr/Syor* c.t. and *Artemisia* steppes. It normally occurs on south or west aspects and moderately steep terrain. The sample plots ranged in elevation from 7,820 to 7,860 ft (2 384 to 2 396 m).

The high coverage of *Artemisia tridentata* is an indicator of the type. Other shrubs with high constancy include *Symphoricarpos oreophilus* and *Berberis repens*. A wide variety of forbs and graminoids may be present, depending upon degree of disturbance. *Poa nervosa, Poa fendleriana, Stipa lettermannii,* and *Melica spectabilis* may be abundant. *Lupinus argenteus* and *Fragaria vesca* have high constancy, but low coverage. Undergrowth productivity is low to moderate.

The overstory is restricted to *Populus tremuloides*. The sites are usually too warm and dry for successful *Abies lasiocarpa* or *Pseudotsuga menziesii* invasion, although scattered *Pinus contorta* may be found as accidentals. This community type is thought to be relatively stable. Overstory production is low to moderate.

The *Potr/Artr* c.t. may be a drier phase of the more common *Potr/Syor* c.t. It differs from the *Potr/Syor* c.t. only in the presence of *Artemisia tridentata*. No other studies have described a *Potr/Artr* c.t., although Steele and others (see footnote 1) found isolated communities similar in undergrowth in southern Idaho on basaltic talus and lava tubes.

Populus tremuloides/Symphoricarpos oreophilus Community Type

(*Potr/Syor* c.t.)

The *Potr/Syor* c.t. is distributed throughout the Wyoming and Salt River Ranges. It was encountered primarily on gentle to moderately steep east and west exposures at elevations between 6,620 and 8,550 ft (2 018 and 2 606 m). The type generally occurs as a band between conifer stands and the *Artemisia* steppe or *Salix* streambanks. Nearby conifer stands usually belong to the *Abies lasiocarpa/Arnica cordifolia* habitat type (Steele and others, see footnote 1).

The abundance of *Symphoricarpos oreophilus,* usually over 20 percent canopy cover, is used as an indicator to the *Potr/Syor* c.t. Associated graminoids and forbs vary with degree of grazing disturbance. Frequently, however, *Bromus carinatus, Elymus glaucus, Melica spectabilis, Geranium viscosissimum,* and *Lupinus argenteus* are prominent. Undergrowth production on the seven stands sampled was moderate.

The overstory consists almost exclusively of *Populus tremuloides*. Only occasional conifers are able to establish and persist on these sites. The type is considered basically a stable *P. tremuloides* community. Overstory production in the sampled stands was low to moderate.

The *Potr/Syor* c.t. usually receives heavy grazing pressure throughout the year. Cattle use these areas during the summer months and deer and elk move down to them during the winter.

The *Potr/Syor* type was first described by Reed (1971) as a climax type in the Wind River Range. Reed's *Potr/Syor* habitat type, however, was a much more broadly defined type, consisting of the *Symphoricarpos oreophilus* union *(Berberis repens, Rosa woodsii, Amelanchier alnifolia, Prunus virginiana,* and *S. oreophilus)* and a wide variety of mesic-site forbs. Morgan (1969) found comparatively stable *Populus* communities

containing *Symphoricarpos utahensis* in Gunnison County, Colorado, and Lewis (data on file Forest Service's Region 4) described a similar *Populus tremuloides/ Symphoricarpos* habitat type in Nevada. North of the study area, Lynch (1955) described a stable *Populetum Symphoricarpetosum* association in Glacier County, Mont., that bears a strong resemblance to our *Potr/Syor* c.t. Kerr and Henderson (1979) described a seral *Potr/ Syor-Bere* type in Utah.

Populus tremuloides/Wyethia amplexicaulis Community Type

(*Potr/Wyam* c.t.)

The *Potr/Wyam* c.t., a minor type along the Wyoming and Salt River Ranges, may be, at least partly, the result of overgrazing by sheep or cattle. It occurs within the middle to lower *Abies lasiocarpa* zone on gentle southeast slopes and flats. The type appears to be restricted to clayey soils that become very hard and packed when dry. Beetle (1961) indicates that the presence of *Wyethia amplexicaulis,* once established, may be an edaphic climax on generally impermeable soils.

The community type is usually open and parklike and easily identified by an almost complete cover of *Wyethia amplexicaulis* (fig. 7). Other species which might occur, but only in trace amounts, include *Lupinus* spp., *Potentilla glandulosa* or *Potentilla gracilis,* and *Symphoricarpos oreophilus. Abies lasiocarpa* seedlings or saplings may be present as accidentals, but show little potential for colonizing the site.

The *Potr/Wyam* c.t. was found in areas that historically received some of the heaviest grazing pressure on the entire Forest. The extent to which *Wyethia* may have invaded overgrazed sites is not known. The utilization of available moisture early in the season by *Wyethia* makes it almost impossible for the natural undergrowth to reestablish even if grazing were to be restricted. Sample plots in this type had young, even-aged canopies and lacked sufficient regeneration to maintain the stand unless subjected to another disturbance, such as fire.

The *Potr/Wyam* c.t. supports one of the least productive overstories. Although the undergrowth biomass on the sampled plots was moderate, it consisted almost entirely of the unpalatable *Wyethia amplexicaulis.*

Figure 7.--Populus tremuloides/Wyethia amplexicaulis *community type in the southern part of the Wyoming Range.*

OTHER COMMUNITIES

Although an attempt has been made in this classification to include all of the variations in aspen communities within the Bridger-Teton National Forest, several communities were encountered that do not fit the classification. These were usually unique or atypical situations for which we had insufficient data to justify community type status. In some cases, these situations may represent community types more prevalent in the neighboring regions for which an aspen classification has not yet been developed.

A single sample plot in the Wind River Range near Elkhart Park was in a pure stand of pole-size *Populus tremuloides*. The undergrowth was dominated by a mixture of *Vaccinium scoparium* and *Rubus parviflorus*. This stand was on a steep boulder field surrounded by even-aged *Pinus contorta* resulting from a recent fire. Presumably, *P. tremuloides* was able to colonize the boulder field because of remnant individuals in a moist meadow below the boulder field. *Vaccinium scoparium* as undergrowth to *P. tremuloides* has not been reported previously in the Intermountain Region.

Two additional sample plots in the Wind River Range were unclassified. One was at the outlet of a small lake where periodic damming by beaver resulted in a high water table. The lush undergrowth is a mixture of *Glyceria striata, Carex vesicaria, Calamagrostis canadensis,* and *Eleocharis palustris*. The other sample plot appeared similar to the *Potr/Thfe* c.t.; the undergrowth, however, differs in the absence of *Thalictrum fendleri* and in the presence of *Arctostaphylos uva-ursi*.

Several situations exist where the natural vegetation has been completely altered by recent disturbance. A young (28-year-old) stand of *Populus tremuloides* resulting from a recent fire in the South LaBarge Creek drainage had been repeatedly grazed by cattle throughout the development of the stand. The undergrowth is completely dominated by *Lupinus argenteus*. Unusually heavy grazing removed most of the undergrowth in two sample plots in the Wyoming Range. These communities would belong to the *Potr/Arco* c.t. under normal conditions, but now are virtually devoid of an herb or shrub layer.

A final community, not fitting the classification, was sampled in Grand Teton National Park. This community most closely resembles the *Potr/Lifi* c.t.; the undergrowth, however, consisted of *Elymus glaucus* and *Aconitum columbianum*.

CONCLUSIONS

Populus tremuloides appears to have a wider ecological amplitude than the associated conifers in the same area. This is exemplified by the variety of associated species contributing to the definition of 26 community types. Elevation for our 186 sample plots ranged from 5,620 to 9,321 ft (1 713 to 2 841 m). *Populus tremuloides* comprises a major portion of the lower timberline zone communities and is also found scattered throughout the upper timberline zone. The communities highest in elevation are usually found on south- or southeast-facing slopes, with a mean elevation of 7,867 ft (2 398 m). Lower communities are usually found on more northern aspects, with a mean elevation of 7,352 ft. (2 241 m). *Populus tremuloides* communities occur most frequently on southern aspects at middle elevations.

Two hundred seventy vascular species were encountered in the *P. tremuloides* communities on the Bridger-Teton Forest. A surprisingly large number of these species occur as regular members of coniferous forest communities. Others are not found under a closed conifer canopy, but are more closely associated with open meadows or *Artemisia* steppes. There is a large difference in site requirements among the individual undergrowth species. Indicator species such as *Equisetum arvense* and *Ranunculus alismaefolius* have high fidelity, occurring in only 2 percent of the total sample plots, but with coverages as high as 90 percent. Other species such as *Geranium viscosissimum* and *Lupinus argenteus* have less rigid requirements, being found in 81 percent and 58 percent of all plots, respectfully.

The variability in undergrowth is a reflection of the variability in successional trends as well as in site characteristics. Of the 26 community types described by this study, 17 have the potential for developing into nine different climax communities dominated by conifers. In addition, nine community types may remain stable *Populus tremuloides* communities. These trends are summarized in table 3.

The natural units of vegetation described as community types in this study have several potential values for the resource manager. They serve as a means of communicating ideas pertaining to sites with similar environments and vegetation. These sites would be expected to respond to similar management actions. The community types serve as a means of accumulating field observations and research results. When coupled with the habitat type classification, realistic management alternatives for all resources may become clearer.

Finally, the community type classification is not a substitute for existing soil surveys, timber surveys, wildlife surveys, or range surveys. It does, however, serve as a natural complement to these studies in the development of more intensive land use plans and successful management practices.

Table 3.--Probable successional trends relating *Populus tremuloides* community types (c.t.) to either stable *P. tremuloides* communities or climax conifer community types (c.c.t.) as described by Steele and others (see footnote 1)

Potr/Raal c.t. →	Questionable stability	
Potr/Eqar c.t. →	*Picea/Eqar* c.c.t.	
Potr/Hela c.t. →	Questionable stability	
Potr/Prvi c.t. →	*Psme/Bere* c.c.t.	
Potr-Abla/Prvi c.t. →	*Abla/Bere* c.c.t.	
Potr/Lifi c.t. →	*Potr-Abla/Lifi* c.t. →	*Abla/Arco* c.c.t.
	→	*Abla/Rimo* c.c.t.
Potr-Abla/Lifi c.t. →	*Abla/Arco* c.c.t.	
→	*Abla/Rimo* c.c.t.	
Potr-Abla/Pera c.t. →	*Abla/Pera* c.c.t.	
Potr/Spbe c.t. →	*Potr-Psme/Spbe* c.t. →	*Psme/Spbe* c.c.t.
	→	*Psme/Syal* c.c.t.
Potr-Psme/Spbe c.t. →	*Psme/Spbe* c.c.t.	
→	*Psme/Syal* c.c.t.	
Potr/Caru c.t. →	Stable	
→	*Abla/Caru* c.c.t.	
→	*Potr-Psme/Caru* c.t. →	*Psme/Caru* c.c.t.
Potr-Psme/Caru c.t. →	*Psme/Caru* c.c.t.	
Potr/Juco c.t. →	Questionable stability	
Potr/Bere c.t. →	*Potr-Abla/Bere* c.t. →	*Abla/Bere* c.c.t.
Potr-Abla/Bere c.t. →	*Abla/Bere* c.c.t.	
Potr/Shca c.t. →	*Potr-Abla/Shca* c.t. →	*Abla/Arco* c.c.t.
Potr-Abla/Shca c.t. →	*Abla/Arco* c.c.t.	
Potr/Arco c.t. →	*Potr-Abla/Arco* c.t. →	*Abla/Arco* c.c.t.
Potr-Abla/Arco c.t. →	*Abla/Arco* c.c.t.	
Potr/Ruoc c.t. →	*Potr-Abla/Ruoc* c.t. →	uncertain
Potr-Abla/Ruoc c.t. →	uncertain	
Potr/Asmi c.t. →	Questionable stability	
Potr/Thfe c.t. →	Questionable stability	
Potr/Artr c.t. →	Stable	
Potr/Syor c.t. →	Stable	
Potr/Wyam c.t. →	Questionable stability	

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APPENDIX A -- CONSTANCY AND CANOPY COVER

Appendix A1. Constancy and average canopy cover (the latter in parenthesis) of important plants in aspen community types within the Bridger-Teton National Forest. (The code for constancy values is at the bottom of the table; canopy cover is the average percent for those stands in which the species was found, except "**" denotes a trace value.)

Community Type:	POTR-ABLA/PRVI	POTR-ABLA/LIFI	POTR-ABLA/PERA	POTR-ABLA/BERE	POTR-ABLA/SHCA	POTR-ABLA/ARCO	POTR-ABLA/RUOC	POTR-PSME/SPBE	PCTR-PSME/CARU	POTR/RAAL	POTR/EQAR	POTR/HELA	POTR/PRVI
No. of stands:	1	5	2	7	6	3	2	2	3	3	2	5	6
TREES													
Populus tremuloides <1 dm. d.b.h.	10(40)	10(21)	10(42)	7(27)	8(15)	10(32)	10(**)	5(2)	10(16)	10(25)	10(11)	10(22)	8(10)
Populus tremuloides 1-3 dm. d.b.h.	10(70)	10(61)	10(35)	10(47)	10(58)	10(45)	10(55)	10(73)	10(42)	10(53)	10(50)	10(47)	10(69)
Populus tremuloides >3 dm. d.b.h.	-(0)	2(15)	-(0)	3(10)	-(0)	-(0)	10(38)	-(0)	3(3)	10(18)	5(10)	10(37)	-(0)
Abies lasiocarpa	10(15)	10(19)	10(20)	9(23)	10(21)	10(52)	10(15)	-(0)	3(**)	10(20)	5(3)	6(5)	-(0)
Picea engelmannii	-(0)	-(0)	5(1)	4(11)	2(35)	-(0)	10(6)	-(0)	-(0)	-(0)	5(3)	2(1)	-(0)
Pseudotsuga mensiezii	-(0)	2(2)	-(0)	3(7)	-(0)	-(0)	-(0)	10(19)	10(21)	-(0)	-(0)	-(0)	3(7)
Pinus contorta	-(0)	-(0)	-(0)	1(**)	3(1)	7(6)	-(0)	-(0)	3(**)	-(0)	10(8)	4(9)	2(10)
Pinus flexilus	-(0)	4(**)	-(0)	6(3)	5(1)	-(0)	-(0)	-(0)	3(**)	-(0)	5(**)	-(0)	-(0)
SHRUBS													
Acer grandidentatum	10(6)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	5(**)	-(0)	-(0)	-(0)	-(0)	3(33)
Amelanchier alnifolia	10(10)	2(1)	-(0)	3(1)	5(1)	3(**)	-(0)	10(8)	3(4)	-(0)	-(0)	-(0)	10(14)
Arctostaphylos uva-ursi	-(0)	-(0)	-(0)	1(**)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)
Artemisia tridentata	-(0)	-(0)	-(0)	1(10)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)
Berberis repens	10(3)	2(1)	- (0)	10(12)	8(3)	-(0)	5(**)	10(4)	3(1)	-(0)	5(**)	-(0)	8(22)
Ceanothus velutinus	-(0)	-(0)	5(1)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)
Juniperus communis	-(0)	-(0)	5(**)	4(1)	2(2)	-(0)	5(**)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)
Lonicera involucrata	-(0)	-(0)	-(0)	-(0)	5(2)	-(0)	-(0)	-(0)	-(0)	3(**)	5(**)	2(1)	-(0)
Pachistima myrsinites	10(15)	2(**)	10(1)	7(9)	8(4)	3(**)	-(0)	5(1)	-(0)	-(0)	-(0)	-(0)	-(0)
Physocarpus malvaceus	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	5(70)	-(0)	-(0)	-(0)	-(0)	-(0)
Potentilla fruticosa	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)
Prunus virginiana	10(60)	-(0)	-(0)	-(0)	2(1)	-(0)	-(0)	5(**)	3(2)	-(0)	-(0)	-(0)	10(32)
Ribes montigenum	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	3(2)	-(0)	-(0)	-(0)
Rosa woodsii	10(40)	4(**)	-(0)	9(1)	7(5)	3(**)	-(0)	10(1)	7(2)	-(0)	-(0)	-(0)	10(14)
Shepherdia canadensis	-(0)	6(1)	10(2)	6(14)	10(27)	3(**)	-(0)	5(1)	-(0)	-(0)	5(1)	-(0)	2(1)
Sorbus scopulina	10(10)	-(0)	-(0)	-(0)	3(2)	-(0)	-(0)	5(10)	-(0)	-(0)	-(0)	-(0)	-(0)
Spiraea betulifolia	-(0)	-(0)	-(0)	-(0)	2(2)	-(0)	-(0)	10(43)	-(0)	-(0)	-(0)	-(0)	-(0)
Symphoricarpos albus	-(0)	-(0)	-(0)	1(4)	-(0)	-(0)	-(0)	5(3)	-(0)	-(0)	-(0)	-(0)	-(0)
Symphoricarpos oreophilis	10(4)	8(1)	10(2)	9(12)	8(2)	3(3)	5(**)	5(2)	7(10)	-(0)	-(0)	2(**)	8(27)
GRAMINOIDS													
Agropyron caninum	-(0)	4(**)	-(0)	4(**)	-(0)	-(0)	-(0)	-(0)	3(1)	-(0)	-(0)	-(0)	2(**)
Bromus carinatus	-(0)	4(3)	-(0)	-(0)	-(0)	-(0)	5(3)	-(0)	-(0)	3(**)	-(0)	4(10)	-(0)
Bromus ciliatus	-(0)	-(0)	-(0)	4(1)	3(3)	-(0)	-(0)	-(0)	3(3)	3(**)	5(**)	-(0)	5(1)
Calamagrostis canadensis	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	5(40)	2(1)	-(0)
Calamagrostis rubescens	10(25)	2(**)	-(0)	3(5)	5(3)	-(0)	-(0)	5(15)	10(37)	-(0)	5(**)	-(0)	8(36)
Carex aquatilis	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	3(20)	-(0)	2(15)	-(0)
Carex geyerii	-(0)	-(0)	-(0)	3(1)	2(5)	-(0)	-(0)	-(0)	-(0)	-(0)	5(**)	-(0)	-(0)
Carex hoodii	-(0)	-(0)	5(**)	3(**)	-(0)	-(0)	5(1)	-(0)	3(**)	-(0)	-(0)	4(1)	2(**)
Carex microptera	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	7(40)	5(1)	-(0)	-(0)
Carex rostrata	-(0)	-(0)	5(1)	4(**)	2(**)	10(7)	5(**)	-(0)	-(0)	-(0)	5(**)	-(0)	-(0)
Elymus glaucus	10(1)	8(4)	-(0)	1(1)	8(1)	-(0)	10(10)	5(**)	10(3)	-(0)	10(32)	6(5)	8(3)
Festuca idahoensis	-(0)	-(0)	-(0)	1(1)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	2(1)
Leucopoa kingii	-(0)	-(0)	-(0)	1(**)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)
Melica spectabilis	-(0)	6(2)	-(0)	1(**)	-(0)	3(7)	10(10)	-(0)	7(1)	7(**)	-(0)	10(4)	2(1)
Phleum pratense	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	5(**)	-(0)	3(**)	3(**)	-(0)	4(1)	2(3)
Poa ampla	-(0)	2(**)	-(0)	1(**)	-(0)	-(0)	-(0)	-(0)	3(1)	-(0)	-(0)	4(2)	-(0)
Poa fendleriana	-(0)	-(0)	-(0)	1(**)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)
Poa nervosa	-(0)	2(**)	5(**)	6(1)	-(0)	7(20)	-(0)	-(0)	3(1)	-(0)	5(**)	3(2)	3(2)
Stipa lettermani	-(0)	-(0)	-(0)	1(1)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	3(2)
Trisetum spicatum	-(0)	-(0)	5(**)	6(1)	2(**)	7(1)	-(0)	-(0)	3(**)	-(0)	5(**)	-(0)	-(0)

Appendix A1 (continued)

FORBS	POTR-ABLA/PRVI	POTR-ABLA/LIFI	POTR-ABLA/PERA	POTR-ABLA/BERE	POTR-ABLA/SHCA	POTR-ABLA/ARCO	POTR-ABLA/RUOC	POTR-PSME/SPBE	POTR-PSME/CARU	POTR/RAAL	POTR/EQAR	POTR/HELA	POTR/PRVI
Achillea millefolium	10(**)	8(1)	5(**)	7(**)	7(**)	10(3)	5(10)	-(0)	7(1)	3(1)	5(1)	6(1)	5(4)
Arnica cordifolia	-(0)	-(0)	10(12)	3(2)	8(6)	10(38)	10(2)	5(**)	7(1)	3(3)	10(3)	-(0)	2(5)
Aster conspicuus	-(0)	-(0)	-(0)	-(0)	2(55)	-(0)	-(0)	-(0)	3(35)	-(0)	-(0)	-(0)	-(0)
Aster engelmannii	10(3	6(4)	10(**)	1(1)	5(17)	7(1)	-(0)	5(**)	3(5)	-(0)	-(0)	4(1)	-(0)
Aster foliaceus	-(0)	4(2)	-(0)	-(0)	2(2)	-(0)	-(0)	-(0)	3(1)	-(0)	-(0)	-(0)	2(2)
Aster perelegans	-(0)	-(0)	-(0)	1(**)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	2(1)
Astragalus miser	-(0)	2(2)	5(**)	1(10)	5(9)	7(**)	-(0)	-(0)	7(6)	-(0)	-(0)	-(0)	-(0)
Balsamorhiza macrophylla	-(0)	-(0)	10(?)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)
Balsamorhiza sagittata	-(0)	-(0)	-(0)	1(10)	3(**)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	2(**)
Campanula rotundifolia	-(0)	-(0)	-(0)	1(**)	-(0)	-(0)	-(0)	-(0)	3(**)	-(0)	-(0)	-(0)	-(0)
Castilleja miniata	-(0)	-(0)	10(1)	-(0)	2(**)	-(0)	5(3)	-(0)	-(0)	-(0)	-(0)	-(0)	2(10)
Castilleja sulphurea	-(0)	6(1)	-(0)	6(**)	5(**)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)
Claytonia lanceolata	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	5(40)	-(0)	-(0)	7(10)	-(0)	-(0)	-(0)
Clematis columbiana	-(0)	-(0)	-(0)	-(0)	2(75)	-(0)	-(0)	5(1)	3(**)	-(0)	-(0)	-(0)	2(20)
Collomia linearis	-(0)	2(**)	-(0)	-(0)	-(0)	3(4)	5(10)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)
Delphinium nuttallianum	-(0)	2(**)	-(0)	1(1)	-(0)	7(1)	5(**)	-(0)	-(0)	-(0)	-(0)	2(**)	-(0)
Delphinium occidentale	10(2)	8(3)	-(0)	-(0)	2(**)	-(0)	5(**)	-(0)	3(5)	3(**)	-(0)	10(13)	2(1)
Descurainia richardsonii	-(0)	-(0)	-(0)	1(**)	-(0)	7(**)	10(**)	-(0)	-(0)	3(1)	-(0)	6(1)	-(0)
Disporum trachycarpum	10(**)	-(0)	-(0)	0(0)	-(0)	-(0)	-(0)	5(1)	-(0)	-(0)	-(0)	-(0)	2(**)
Epilobium angustifolium	10(1)	4(1)	-(0)	7(**)	8(1)	-(0)	-(0)	5(10)	7(2)	-(0)	5(**)	2(**)	2(1)
Equisetum arvense	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	3(2)	10(75)	2(4)	-(0)
Erigeron peregrinus	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	3(2)	10(1)	2(1)	2(3)
Erigeron speciosus	-(0)	2(**)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	3(**)	-(0)	-(0)	-(0)	-(0)
Fragaria vesca	10(1)	2(**)	-(0)	9(1)	8(1)	3(**)	5(1)	-(0)	10(1)	-(0)	5(2)	2(2)	7(4)
Frasera speciosa	-(0)	-(0)	5(**)	10(1)	8(1)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)
Galium boreale	-(0)	6(1)	-(0)	6(1)	7(**)	-(0)	-(0)	-(0)	7(1)	-(0)	-(0)	4(3)	7(2)
Geranium richardsonii	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	5(3)	-(0)	-(0)	3(2)	10(4)	4(45)	2(1)
Geranium viscosissimum	10(2)	8(19)	5(30)	10(3)	10(8)	10(7)	5(5)	5(**)	7(13)	7(1)	5(1)	6(11)	10(3)
Hackelia floribunda	10(**)	2(20)	-(0)	-(0)	2(**)	-(0)	5(**)	-(0)	-(0)	-(0)	-(0)	2(10)	3(3)
Hedysarum boreale	-(0)	4(15)	-(0)	7(2)	5(1)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)
Helianthella uniflora	-(0)	6(6)	-(0)	4(4)	3(2)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	2(1)	2(1)
Heracleum lanatum	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	5(10)	-(0)	-(0)	3(**)	5(**)	10(38)	2(1)
Hydrophyllum capitatum	-(0)	4(1)	5(**)	1(**)	-(0)	3(**)	10(**)	-(0)	-(0)	3(**)	-(0)	4(8)	-(0)
Ligusticum filicinum	-(0)	8(29)	-(0)	-(0)	7(**)	7(1)	5(5)	-(0)	3(25)	7(1)	-(0)	4(9)	2(50)
Lupinus argenteus	-(0)	8(2)	-(0)	6(**)	8(2)	3(5)	-(0)	5(**)	7(6)	-(0)	-(0)	-(0)	7(5)
Mertensia cilia	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	5(2)	6(8)	-(0)
Nemophila breviflora	-(0)	4(40)	-(0)	-(0)	-(0)	7(18)	10(23)	-(0)	3(1)	10(2)	-(0)	8(21)	-(0)
Osmorhiza chilensis	10(5)	6(13)	5(**)	1(2)	8(2)	10(20)	10(9)	10(1)	10(3)	10(**)	10(6)	4(20)	5(4)
Osmorhiza occidentalis	10(10)	6(40)	-(0)	1(10)	3(1)	3(1)	10(2)	-(0)	-(0)	3(**)	-(0)	6(2)	-(0)
Pedicularis bracteosa	-(0)	4(1)	5(15)	4(2)	5(1)	-(0)	10(8)	5(**)	7(3)	3(20)	5(12)	6(19)	-(0)
Pedicularis racemosa	-(0)	-(0)	10(38)	-(0)	-(0)	-(0)	° -(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)
Perideridia gairdneri	-(0)	2(1)	-(0)	-(0)	3(**)	-(0)	5(5)	-(0)	3(1)	-(0)	-(0)	2(**)	3(1)
Potentilla glandulosa	-(0)	6(1)	10(**)	6(1)	3(**)	7(**)	-(0)	-(0)	-(0)	-(0)	-(0)	2(**)	3(1)
Potentilla gracilis	-(0)	2(**)	-(0)	4(2)	3(**)	-(0)	-(0)	-(0)	7(**)	-(0)	-(0)	-(0)	3(1)
Ranunculus alismaefolius	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	10(60)	-(0)	-(0)	-(0)
Rudbeckia occidentalis	-(0)	4(10)	-(0)	-(0)	-(0)	3(5)	10(33)	-(0)	-(0)	10(7)	-(0)	10(43)	5(1)
Senecio crassulus	-(0)	6(1)	-(0)	-(0)	2(**)	-(0)	5(**)	-(0)	-(0)	-(0)	-(0)	2(1)	-(0)
Senecio serra	10(**)	2(**)	-(0)	-(0)	-(0)	-(0)	5(20)	-(0)	3(2)	-(0)	-(0)	2(**)	-(0)
Senecio streptanthifolius	10(**)	-(0)	-(0)	3(**)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)
Senecio triangularis	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	5(15)	2(2)	-(0)
Smilacina stellata	10(1)	-(0)	-(0)	6(1)	-(0)	-(0)	-(0)	5(**)	-(0)	-(0)	5(**)	2(10)	7(2)
Solidago multiraciata	-(0)	-(0)	-(0)	-(0)	3(2)	3(2)	-(0)	-(0)	7)**)	-(0)	-(0)	-(0)	-(0)
Stellaria jamesiana	-(0)	2(5)	5(1)	1(**)	-(0)	3(10)	5(2)	-(0)	-(0)	7(5)	-(0)	2(15)	2(**)
Taraxacum officinale	10(**)	10(5)	5(**)	3(**)	2(**)	10(14)	5(2)	-(0)	-(0)	7(1)	-(0)	6(5)	5(3)
Thalictrum fendleri	10(2)	8(7)	5(5)	10(7)	10(17)	7(1)	10(2)	10(**)	7(14)	-(0)	10(8)	8(33)	8(14)
Trifolium longipes	-(0)	4(31)	-(0)	-(0)	-(0)	3(25)	10(50)	-(0)	-(0)	7(28)	5(10)	8(36)	2(3)
Valeriana occidentalis	-(0)	8(4)	5(**)	6(1)	-(0)	7(6)	10(20)	-(0)	7(4)	7(5)	-(0)	8(18)	3(**)
Viola adunca	-(0)	2(**)	-(0)	4(1)	7(**)	-(0)	-(0)	-(0)	3(**)	-(0)	5(1)	-(0)	-(0)
Viola nuttallii	10(**)	-(0)	10(**)	-(0)	2(**)	10(2)	10(5)	-(0)	-(0)	3(**)	-(0)	2(**)	2(1)
Wyethia amplexicaulis	-(0)	4(4)	5(**)	1(**)	5(1)	-(0)	-(0)	-(0)	3(**)	-(0)	-(0)	-(0)	-(0)

Code of constancy values: + = <5%, 1 = 5-15%, 2 = 15-25%, 3 = 25-35%, 4 = 35-45%, 5 = 45-55%, 6 = 55-65%, 7 = 65-75%, 8 = 75-85%, 9 = 85-95%, 10 = 95-100%.

Appendix A2. Constancy and average canopy cover (the latter in parenthesis) of important plants in aspen community types within the Bridger-Teton National Forest. (The code for constancy values is at the bottom of the table; canopy cover is the average percent for those stands in which the species was found, except "**" denotes a trace value.)

Community Type:	POTR/ LIFI	POTR/ SPBE	POTR/ CARU	POTR/ JUCO	POTR/ BERE	POTR/ SHCA	POTR/ ARCO	POTR/ ASMI	POTR/ THFE	POTR/ RUOC	POTR/ ARTR	POTR/ SYOR	POTR/ WYAM
No. of stands:	19	6	30	2	15	5	9	6	16	9	4	7	2
TREES													
Populus tremuloides <1 dm. d.b.h.	10(14)	10(17)	10(29)	10(60)	10(33)	10(20)	10(32)	10(24)	9(13)	10(26)	10(40)	10(26)	10(5)
Populus tremuloides 1-3 dm. d.b.h.	10(56)	8(58)	10(56)	10(25)	9(56)	10(56)	10(51)	10(65)	10(68)	10(59)	10(36)	10(60)	10(68)
Populus tremuloides >3 dm. d.b.h.	5(24)	-(0)	3(21)	-(0)	1(13)	4(3)	1(50)	3(10)	1(38)	2(13)	-(0)	3(13)	-(0)
Abies lasiocarpa	4(6)	2(**)	4(1)	-(0)	3(4)	10(**)	8(6)	3(**)	3(2)	8(3)	3(**)	7(**)	5(**)
Picea engelmannii	2(**)	-(0)	1(**)	-(0)	1(1)	10(3)	-(0)	2(**)	1(**)	1(1)	-(0)	-(0)	-(0)
Pseudotsuga mensiezii	1(**)	10(5)	2(4)	-(0)	3(1)	-(0)	1(7)	-(0)	-(0)	-(0)	-(0)	-(0)	5(**)
Pinus contorta	1(1)	2(**)	2(2)	5(8)	3(5)	2(2)	6(8)	-(0)	-(0)	2(2)	5(5)	1(**)	-(0)
Pinus flexilus	3(5)	-(0)	5(1)	10(6)	5(2)	8(1)	4(1)	8(2)	4(1)	1(**)	3(1)	1(**)	-(0)
SHRUBS													
Acer grandidentatum	-(0)	7(1)	-(0)	-(0)	1(45)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)
Amelanchier alnifolia	1(**)	8(17)	5(3)	-(0)	5(5)	-(0)	1(2)	-(0)	1(1)	-(0)	5(3)	4(1)	-(0)
Arctostaphylos uva-ursi	-(0)	-(0)	1(2)	5(45)	1(13)	2(**)	1(**)	-(0)	1(3)	-(0)	-(0)	1(1)	-(0)
Artemisia tridentata	1(**)	-(0)	+(1)	-(0)	1(1)	-(0)	2(1)	-(0)	1(**)	2(**)	10(18)	4(1)	5(1)
Berberis repens	1(3)	7(2)	5(10)	10(40)	10(29)	2(1)	2(1)	3(4)	2(1)	-(0)	8(5)	3(1)	-(0)
Ceanothus velutinus	-(0)	2(**)	+(15)	-(0)	1(**)	-(0)	1(2)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)
Juniperus communis	1(2)	2(**)	1(1)	10(45)	1(**)	-(0)	-(0)	-(0)	-(0)	-(0)	5(1)	1(3)	-(0)
Lonicera involucrata	-(0)	-(0)	1(1)	-(0)	-(0)	2(1)	1(**)	2(**)	1(**)	-(0)	-(0)	-(0)	-(0)
Pachistima myrsinites	1(**)	5(1)	2(19)	5(30)	4(2)	-(0)	1(3)	-(0)	1(**)	-(0)	3(**)	3(10)	-(0)
Physocarpus malvaceus	-(0)	3(**)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)
Potentilla fruticosa	-(0)	-(0)	+(**)	-(0)	1(1)	4(6)	-(0)	-(0)	3(2)	-(0)	5(3)	-(0)	-(0)
Prunus virginiana	1(**)	7(4)	3(2)	-(0)	3(2)	-(0)	1(**)	-(0)	1(**)	-(0)	8(4)	3(4)	-(0)
Ribes montigenum	1(**)	-(0)	-(0)	-(0)	-(0)	-(0)	1(3)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)
Rosa woodsii	2(**)	8(5)	8(8)	5(1)	7(3)	10(25)	1(70)	5(14)	8(1)	2(1)	10(1)	7(5)	-(0)
Shepherdia canadensis	3(4)	-(0)	2(3)	10(20)	6(7)	10(37)	4(2)	5(1)	4(2)	2(1)	3(2)	1(1)	5(**)
Sorbus scopulina	-(0)	3(3)	-(0)	-(0)	1(1)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)
Spiraea betulifolia	-(0)	10(46)	-(0)	-(0)	1(**)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)
Symphoricarpos albus	-(0)	3(7)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)
Symphoricarpos oreophilis	6(1)	5(11)	6(8)	10(3)	5(8)	8(6)	7(15)	7(3)	7(4)	7(7)	8(15)	10(32)	10(**)
GRAMINOIDS													
Agropyron caninum	5(2)	-(0)	4(**)	5(**)	3(**)	6(1)	3(1)	2(**)	7(**)	6(2)	-(0)	3(2)	5(**)
Bromus carinatus	7(3)	-(0)	4(1)	5(2)	3(3)	-(0)	3(4)	5(**)	4(**)	9(13)	8(7)	7(13)	-(0)
Bromus ciliatus	3(12)	-(0)	5(6)	-(0)	3(4)	8(24)	2(1)	2(**)	4(2)	-(0)	-(0)	3(**)	5(**)
Calamagrostis canadensis	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	1(**)	-(0)	-(0)	-(0)
Calamagrostis rubescens	2(11)	10(14)	9(48)	-(0)	3(2)	-(0)	-(0)	-(0)	3(2)	2(1)	-(0)	1(6)	-(0)
Carex aquatilis	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)
Carex geyerii	1(**)	-(0)	3(45)	5(**)	4(7)	-(0)	-(0)	2(**)	-(0)	1(**)	-(0)	-(0)	-(0)
Carex hoodii	3(1)	-(0)	1(**)	-(0)	2(1)	2(1)	2(1)	-(0)	3(1)	4(**)	3(**)	4(1)	-(0)
Carex microptera	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)
Carex rostrata	1(**)	-(0)	1(**)	-(0)	5(**)	2(**)	6(1)	3(**)	1(1)	-(0)	3(**)	6(1)	10(**)
Elymus glaucus	7(9)	8(1)	6(5)	5(**)	5(4)	-(0)	2(**)	2(1)	4(1)	6(2)	5(3)	10(11)	5(**)
Festuca idahoensis	-(0)	-(0)	1(1)	5(**)	2(**)	-(0)	2(1)	2(2)	4(1)	3(**)	8(7)	1(2)	5(4)
Leucopoa kingii	-(0)	-(0)	+(**)	-(0)	1(1)	-(0)	-(1)	5(6)	1(3)	-(0)	5(1)	-(0)	-(0)
Melica spectabilis	5(2)	-(0)	2(1)	-(0)	4(1)	-(0)	3(3)	2(**)	1(2)	9(14)	8(16)	7(14)	5(1)
Phleum pratense	1(**)	3(**)	2(1)	-(0)	3(4)	-(0)	1(**)	2(**)	1(**)	6(1)	-(0)	3(3)	10(**)
Poa ampla	4(2)	-(0)	2(2)	-(0)	2(1)	2(**)	2(1)	5(1)	6(1)	3(14)	5(5)	3(5)	5(**)
Poa fendleriana	-(0)	-(0)	-(0)	5(1)	-(0)	4(**)	1(3)	-(0)	-(0)	-(0)	8(10)	-(0)	-(0)
Poa nervosa	3(4)	3(3)	2(10)	10(1)	4(6)	4(**)	7(2)	8(**)	5(2)	9(6)	5(6)	6(14)	5(**)
Stipa lettermani	1(**)	-(0)	3(1)	-(0)	3(3)	4(1)	2(1)	7(1)	8(1)	-(0)	3(5)	4(1)	5(1)
Trisetum spicatum	3(2)	-(0)	1(1)	5(**)	2(1)	4(1)	6(1)	5(1)	5(**)	2(1)	3(1)	-(0)	-(0)

Appendix A2 (continued)

FORBS	POTR/ LIFI	POTR/ SPBE	POTR/ CARU	POTR/ JUCO	POTR/ BERE	POTR/ SHCA	POTR/ ARCO	POTR/ ASMI	POTR/ THFE	POTR/ RUOC	POTR/ ARTR	POTR/ SYOR	POTR/ WYAM
Achillea millefolium	6(1)	8(**)	7(1)	10(2)	6(2)	10(2)	10(1)	10(1)	8(**)	10(2)	5(2)	9(1)	10(2)
Arnica cordifolia	2(4)	3(2)	2(3)	10(2)	3(15)	4(8)	10(30)	3(2)	2(1)	3(3)	-(0)	1(10)	-(0)
Aster conspicuus	-(0)	2(30)	2(24)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)
Aster engelmannii	4(16)	5(1)	2(2)	-(0)	3(**)	-(0)	3(1)	-(0)	2(**)	1(1)	-(0)	3(1)	-(0)
Aster foliaceus	3(1)	2(**)	2(**)	-(0)	1(1)	-(0)	2(1)	7(**)	7(**)	2(1)	-(0)	3(**)	5(**)
Aster perelegans	1(**)	2(**)	1(**)	-(0)	2(1)	-(0)	1(**)	5(1)	5(1)	1(**)	3(15)	1(**)	5(**)
Astragalus miser	4(6)	-(0)	3(6)	-(0)	1(**)	6(15)	2(40)	10(56)	1(2)	-(0)	-(0)	1(**)	-(0)
Balsamorhiza macrophylla	1(15)	-(0)	-(0)	-(0)	-(0)	-(0)	4(4)	-(0)	-(0)	3(27)	-(0)	3(12)	-(0)
Balsamorhiza sagittata	2(1)	-(0)	1(1)	-(0)	3(6)	-(0)	-(0)	2(**)	1(**)	-(0)	-(0)	-(0)	-(0)
Campanula rotundifolia	1(1)	5(**)	4(**)	10(**)	3(**)	2(5)	-(0)	5(**)	1(**)	-(0)	-(0)	-(0)	-(0)
Castilleja miniata	-(0)	3(**)	1(1)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)
Castilleja sulphurea	4(4)	-(0)	1(1)	5(**)	1(**)	-(0)	1(1)	3(6)	3(**)	1(**)	5(1)	3(1)	5(**)
Claytonia lanceolata	1(**)	-(0)	-(0)	-(0)	-(0)	-(0)	3(4)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)
Clematis columbiana	-(0)	3(1)	+(2)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)
Collomia linearis	4(2)	-(0)	2(**)	-(0)	1(1)	-(0)	3(**)	-(0)	1(20)	7(1)	-(0)	4(1)	5(**)
Delphinium nuttallianum	2(**)	-(0)	-(0)	-(0)	-(0)	-(0)	1(**)	-(0)	1(**)	6(1)	3(**)	3(**)	-(0)
Delphinium occidentale	7(4)	-(0)	2(1)	-(0)	1(**)	2(4)	-(0)	-(0)	1(**)	6(1)	-(0)	1(**)	-(0)
Descurainia richardsonii	3(**)	-(0)	-(0)	-(0)	1(**)	-(0)	-(0)	-(0)	1(**)	2(**)	-(0)	4(**)	-(0)
Disporum trachycarpum	-(0)	5(**)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)
Epilobium angustifolium	5(1)	5(4)	7(9)	5(2)	5(1)	10(5)	2(1)	7(1)	7(2)	3(**)	-(0)	1(**)	5(1)
Equisetum arvense	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)
Erigeron peregrinus	-(0)	-(0)	1(**)	5(**)	-(0)	-(0)	1(3)	-(0)	-(0)	1(**)	-(0)	-(0)	-(0)
Erigeron speciosus	-(0)	-(0)	+(**)	-(0)	2(1)	-(0)	-(0)	-(0)	-(0)	1(**)	5(6)	1(4)	-(0)
Fragaria vesca	7(1)	-(0)	5(3)	5(4)	5(4)	10(17)	1(4)	5(28)	9(4)	6(1)	8(4)	7(1)	-(0)
Frasera speciosa	2(1)	-(0)	3(1)	5(1)	2(**)	6(1)	2(**)	3(1)	3(**)	1(**)	3(**)	3(1)	-(0)
Galium boreale	3(**)	7(1)	6(5)	-(0)	3(2)	8(37)	2(1)	2(3)	6(2)	3(**)	-(0)	3(**)	-(0)
Geranium richardsonii	1(2)	-(0)	1(**)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	1(1)	-(0)	-(0)	-(0)
Geranium viscosissimum	9(14)	7(**)	9(6)	-(0)	6(7)	10(21)	9(7)	8(24)	9(6)	8(5)	8(2)	9(8)	10(2)
Hackelia floribunda	5(4)	-(0)	+(**)	-(0)	2(1)	-(0)	-(0)	-(0)	3(2)	4(2)	3(**)	4(1)	-(0)
Hedysarum boreale	5(3)	2(1)	3(6)	-(0)	3(11)	2(20)	-(0)	5(3)	5(1)	-(0)	-(0)	1(**)	-(0)
Helianthella uniflora	6(5)	-(0)	1(1)	-(0)	5(1)	-(0)	-(0)	-(0)	2(7)	1(**)	3(2)	4(1)	5(3)
Heracleum lanatum	1(**)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	1(5)	-(0)	-(0)	-(0)
Hydrophyllum capitatum	3(**)	-(0)	-(0)	-(0)	-(0)	-(0)	4(2)	-(0)	-(0)	6(1)	-(0)	3(**)	-(0)
Ligusticum filicinum	10(31)	-(0)	1(1)	-(0)	2(3)	-(0)	3(1)	2(**)	1(**)	4(1)	-(0)	1(**)	-(0)
Lupinus argenteus	8(10)	8(2)	7(3)	10(6)	7(2)	10(10)	4(2)	7(21)	8(1)	3(1)	8(16)	9(7)	5(2)
Mertensia cilia	1(**)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	1(1)	-(0)	-(0)	-(0)
Nemophila breviflora	3(25)	-(0)	-(0)	-(0)	1(1)	-(0)	2(2)	-(0)	1(40)	6(36)	3(5)	3(4)	5(4)
Osmorhiza chilensis	4(4)	7(1)	5(7)	-(0)	3(7)	6(2)	7(1)	3(1)	2(**)	4(4)	3(**)	4(2)	-(0)
Osmorhiza occidentalis	4(22)	-(0)	-(0)	-(0)	2(4)	-(0)	1(5)	-(0)	-(0)	4(2)	-(0)	7(3)	5(**)
Pedicularis bracteosa	5(3)	3(**)	2(1)	-(0)	2(3)	4(50)	2(**)	-(0)	4(3)	1(5)	-(0)	1(**)	-(0)
Pedicularis racemosa	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)
Perideridia gairdneri	3(**)	7(**)	3(1)	-(0)	2(1)	-(0)	1(1)	2(**)	1(**)	6(4)	-(0)	4(**)	10(**)
Potentilla glandulosa	2(1)	2(**)	6(**)	-(0)	3(4)	2(**)	3(2)	3(1)	5(1)	1(**)	8(1)	9(2)	10(1)
Potentilla gracilis	6(1)	-(0)	3(1)	-(0)	3(2)	4(1)	2(2)	5(1)	9(2)	6(1)	3(**)	7(1)	5(3)
Ranunculus alismaefolius	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)
Rudbeckia occidentalis	3(22)	-(0)	+(**)	-(0)	-(0)	-(0)	3(5)	2(**)	-(0)	8(29)	-(0)	1(1)	-(0)
Senecio crassulus	5(1)	-(0)	+(**)	-(0)	-(0)	-(0)	-(0)	-(0)	1(**)	3(1)	-(0)	1(1)	-(0)
Senecio serra	3(1)	-(0)	2(1)	-(0)	1(**)	4(**)	-(0)	-(0)	1(**)	6(2)	-(0)	6(3)	5(**)
Senecio streptanthifolius	-(0)	-(0)	1(**)	-(0)	2(**)	4(**)	3(**)	2(**)	1(**)	-(0)	3(1)	1(1)	-(0)
Senecio triangularis	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)	-(0)
Smilacina stellata	-(0)	5(1)	2(1)	-(0)	2(4)	2(**)	-(0)	2(**)	4(1)	-(0)	-(0)	-(0)	-(0)
Solidago multiraciata	2(1)	-(0)	1(**)	5(2)	1(**)	8(**)	1(1)	2(1)	1(**)	3(1)	3(**)	1(**)	-(0)
Stellaria jamesiana	4(6)	-(0)	1(**)	-(0)	1(**)	-(0)	4(2)	-(0)	-(0)	4(6)	-(0)	1(4)	-(0)
Taraxacum officinale	6(5)	2(**)	6(2)	-(0)	3(1)	2(2)	6(**)	2(1)	3(**)	7(1)	5(1)	7(3)	10(**)
Thalictrum fendleri	9(20)	10(5)	6(13)	-(0)	6(3)	8(22)	4(4)	7(28)	10(24)	9(2)	8(1)	9(1)	5(**)
Trifolium longipes	1(2)	-(0)	+(1)	-(0)	-(0)	-(0)	1(40)	-(0)	-(0)	4(3)	-(0)	1(10)	-(0)
Valeriana occidentalis	7(5)	-(0)	2(1)	-(0)	1(1)	8(5)	3(1)	-(0)	3(1)	6(4)	-(0)	6(1)	-(0)
Viola adunca	1(**)	-(0)	1(1)	-(0)	1(**)	4(**)	1(2)	-(0)	3(**)	-(0)	-(0)	-(0)	5(**)
Viola nuttallii	3(**)	-(0)	-(0)	-(0)	1(**)	-(0)	6(2)	2(**)	1(**)	6(**)	-(0)	1(**)	-(0)
Wyethia amplexicaulis	3(7)	-(0)	-(0)	-(0)	1(**)	-(0)	2(1)	-(0)	1(30)	3(5)	-(0)	-(0)	10(83)

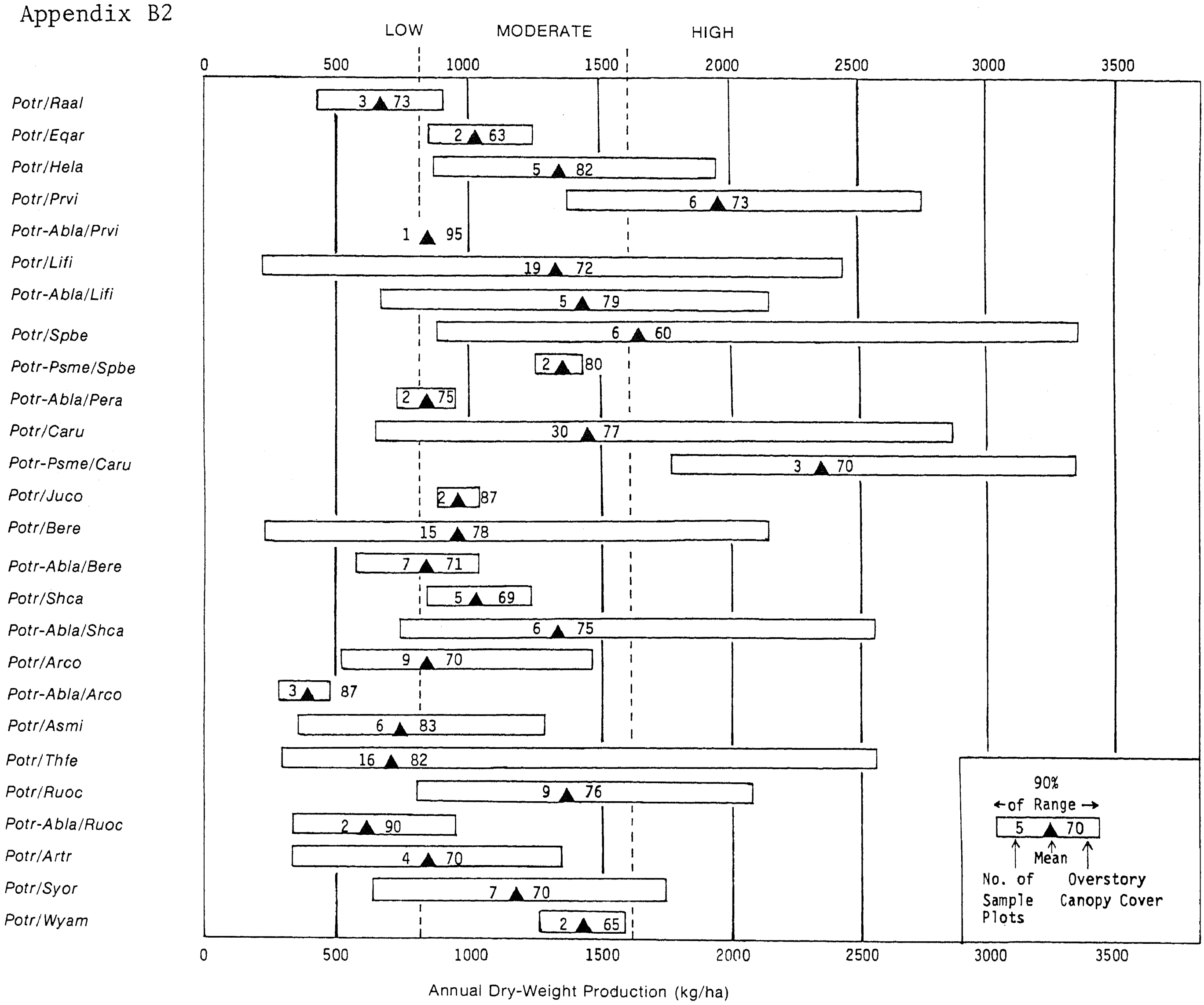
Code of constancy values: + = <5%, 1 = 5-15%, 2 = 15-25%, 3 = 25-35%, 4 = 35-45%, 5 = 45-55%, 6 = 55-65%, 7 = 65-75%, 8 = 75-85%, 9 = 85-95%, 10 = 95-100%.

APPENDIX B -- PRODUCTIVITY

Appendix B1. Mean productivity by community type. (Means are shown with 95 percent confidence limits where n ≥ 5, or one standard deviation where n < 5, for undergrowth and overstory production. Overstory production is mean annual increment.)

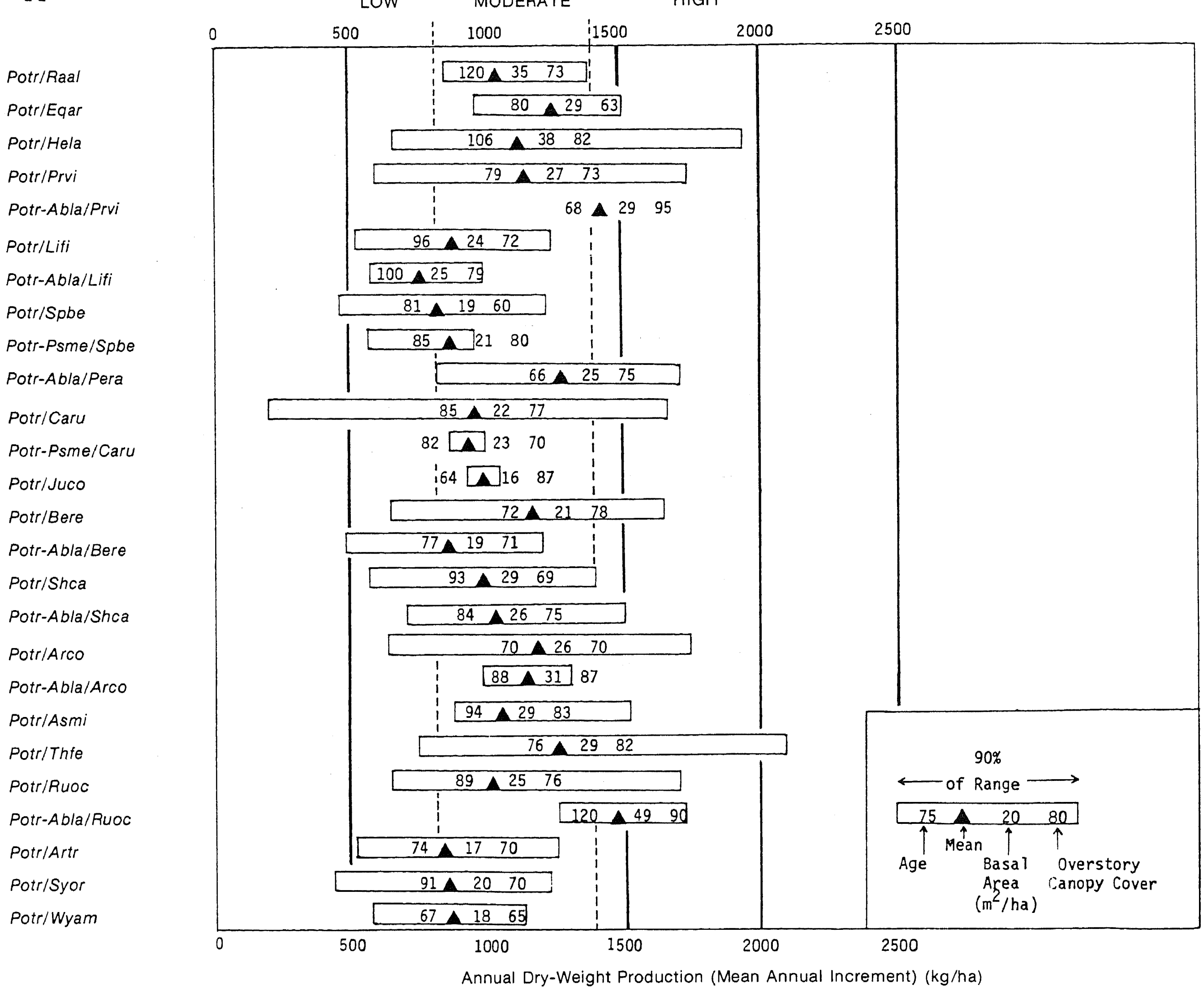
Community type	Number of plots	Undergrowth productivity	Overstory			
			Age	Basal area	Canopy cover	Productivity
		kg/ha		*m^2/ha*		*kg/ha*
Potr/Raal	3	683(338)	120	35	73	1064(320)
Potr/Eqar	2	1051(310)	80	29	63	1245(418)
Potr/Hela	5	1333±759	106	38±20	82±14	1121±693
Potr/Prvi	6	1973±543	79	27±16	73±12	1159±537
Potr-Abla/Prvi	1	856(?)	68	29	95	1438(?)
Potr/Lifi	19	1324±365	96	24±3	72±6	880±121
Potr-Abla/Lifi	5	1420±724	100	25±7	79±10	784±237
Potr/Spbe	6	1676±1318	81	19±6	60±18	805±385
Potr-Psme/Spbe	2	1339(92)	85	21	80	864(449)
Potr-Abla/Pera	2	845(174)	66	25	75	1284(776)
Potr/Caru	30	1454±253	85	22±3	77±5	938±140
Potr-Psme/Caru	3	2346(972)	82	23	70	927(68)
Potr/Juco	2	963(106)	64	16	87	975(95)
Potr/Bere	15	967±372	72	21±6	78±6	1150±240
Potr-Abla/Bere	7	822±180	77	19±10	71±10	853±282
Potr/Shca	5	1032±235	93	29±10	69±11	991±504
Potr-Abla/Shca	6	1357±798	84	26±10	75±17	1039±329
Potr/Arco	9	848±379	70	26±9	70±11	1191±305
Potr-Abla/Arco	3	370(104)	88	31	87	1116(149)
Potr/Asmi	6	755±385	94	29±8	83±12	1079±331
Potr/Thfe	16	702±325	76	29±6	82±6	1288±237
Potr/Ruoc	9	1380±397	89	25±7	76±16	1005±350
Potr-Abla/Ruoc	2	642(518)	120	49	90	1478(398)
Potr/Artr	4	841(581)	74	17	70	845(347)
Potr/Syor	7	1187±355	91	20±5	70±10	853±281
Potr/Wyam	2	1438(62)	67	18	65	858(377)

Appendix B2



Appendix B2. Estimated undergrowth productivity by community types.

Appendix B3



Appendix B3. Estimated overstory productivity by community types.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1981—677-121/81 Region No. 8

Youngblood, A. P., and W. F. Mueggler.
1981. Aspen community types on the Bridger-Teton National Forest in Western Wyoming. USDA For. Serv. Res. Pap INT-272, 34 p. Intermt. For. and Range Exp. Stn., Ogden, Utah 84401

A community type classification is presented for aspen-dominated communities on the Bridger-Teton National Forest. A diagnostic key that utilizes indicator plant species is provided for field identification of 26 community types. Tables are provided for detailed comparison of vegetation composition. Environment, relationship to surrounding vegetation, successional status, and productivity are discussed.

KEYWORDS: aspen forests, Wyoming, vegetation classification, community types.